

1989

PERFORMANCE REPORT

WATER QUALITY SECTION

TD
380
P47
MOE



Environment
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1989
PERFORMANCE REPORT
WATER QUALITY SECTION

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Laboratory Services Branch
Ontario Ministry of the Environment

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INTRODUCTION

The Water Quality Section is part of the Ministry of the Environment's Laboratory Services Branch. The section provides the Ministry with expertise in microbiology and inorganic chemistry. The largest number of tests in the branch are handled by the Water Quality Units, where staff analyze a broad spectrum of environmental sample types including: ground water, surface water, drinking water, precipitation, sewage, industrial waste, leachate, soil and soil extract.

This report provides an outline of the section's quality control program (QC) along with a summary of the resulting 1989 performance data for each test. The Water Quality Section strives to maintain a high standard of analytical performance through its quality assurance program and QC is an integral part of the process.

ACKNOWLEDGEMENTS

This report is dedicated to the technicians of the Water Quality Section.

and

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1.0 Quality Control Program - Chemistry

Quality control is a continuous process that involves constant checks of sample processing. Control activities that are conducted before sample analysis begins are checks on reagent chemicals, water purity, materials that are in contact with sample, and calibration.

Reagent chemicals are selected according to specific test method requirements.

Water purity is checked by daily monitoring for conductivity. Operations generally require conductivity levels of ≤ 1 uS/cm. Some procedures require purer water and this is accomplished by further refining the distilled water through a deionizing system.

Material checks are done on sample containers, filters, glassware and other equipment. These are checked for leaching, adsorption and contamination.

Calibration is conducted by analyzing a series of calibration standards covering the analytical range. Since a high degree of both precision and accuracy is required to detect and minimize any between-run changes, the standards are analyzed with as little handling as possible.

Once a system has been calibrated, quality control begins. Depending on the analytical procedure, quality control may be used to evaluate: calibration, blank, recovery, sensitivity, potential interference, and duplicate analysis.

1.1 Calibration and Blank

Calibration is controlled by a minimum of two quality control standards and a long term blank which are prepared and maintained independently of the calibration standards. The system is not calibrated with the quality control standards. The long term blank is deionized, distilled water and any reagent chemicals used in the pre-treatment of samples. Control standards are prepared less frequently than calibration standards and errors in newly prepared calibration standards can be detected by this cross check. Newly prepared control standards are run in parallel with the old control standards and must meet control requirements over three consecutive runs before the new standards are accepted on line.

The control standards data is assessed and compared against the control limits established from previous data to determine whether the calibration process is in control. The control limits are examined yearly and may be adjusted if the method performance improves and/or the historical data base is increased. The control limits are usually established at a new work station using the equations: $\pm 4.0 \times S_{A-B}$ and $\pm 3.0 \times S_{A-B}$ for the sum and difference of the control standards respectively. If either the sum or the difference of the control standards exceeds the control limits, the analysis is stopped, corrective action taken and the control standards are re-analyzed.

The standard deviation of the control standards is used to estimate the between run standard deviation (S) and is compared against the within run standard deviation (S_w). If the ratio S/S_w exceeds 1.5 then poor control of systematic error can be inferred (1). Values for S and S_w are calculated as follows:

$$2S^2 = (S_A)^2 + (S_B)^2$$

$$2S_w^2 = (S_{A-B})^2$$

Where

S_A = standard deviation of control standard A

S_B = standard deviation of control standard B

S_{A-B} = standard deviation of the difference between control standards A and B

NOTE: If a second range is employed for a test, more control standards are used because, in many systems, the between run standard deviations are concentration dependent.

Detailed description of the quality control processes are outlined in several LSB reports (2)(3)(4)(5):

1.2 Recovery

Some methods require sample pre-treatment, such as digestion or extraction. A recovery check, suitable to that method, is required to estimate the efficiency of the pre-treatment. Recovery standards are usually prepared at 0%, 20% and 80% of full scale. The solutions are analyzed in the same manner as routine samples. Although these solutions are not used to calibrate the instrument, corrections for the blank and matrix effects are calculated and applied if necessary. For an analytical run to be accepted, the recoveries should be within $\pm(5\% + T/2)$ of their expected values. (T is defined in Appendix A). The average blank should be within three standard deviations of its historical mean. If a second range is employed for a test, at least one additional recovery standard is used.

1.3 Sensitivity and Baseline

Any change in the sensitivity of the instrumentation is monitored periodically by analyzing a standard that is usually 80% of full scale, and comparing the peak height to the original calibration standards. Baseline drift is usually recorded by periodic analysis of deionized, distilled water (DDW) which does not contain any of the analyte, but may be adjusted to correspond to sample pre-treatment.

1.4 Interference

Interference checks are run on any test where a substance may be present in large enough concentration to affect the results. The checks are near the threshold concentration, beyond which the methodological safeguards used to minimize the interferences are no longer effective. These checks indicate that the interferences have no effect up to the specified concentrations. Spiked samples are not analyzed on a routine basis.

1.5 Duplicate Analysis

Samples are selected for non-adjacent, within-run duplicate analyses. By analyzing samples in duplicate, the ability of the analyst to obtain repeatable analytical results, within an analytical run, can be determined. For results to be acceptable, at least two-thirds of the duplicate data must conform to limits which are based on historical performance.

The observed differences in duplicate results are accumulated and sorted according to sample concentration span. A standard deviation is calculated for each sample concentration span. The algorithm differs from the conventional standard deviation as follows:

Conventional Std. Dev. (1)*	Std. Dev. of Duplicates (2)*
* standard deviations calculated for the performance report data summary pages	

$$S_1 = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n - 1}}$$

$$S_2 = \sqrt{\frac{\sum_{i=1}^{n'} (x_1 - x_2)_i^2}{2n'}}$$

Where

S_1 = sample standard deviation

S_2 = duplicate difference standard deviation

n = number of data

\bar{x} = mean of data

x_i = i^{th} result

$(x_1 - x_2)_i$ = difference of the i^{th} duplicate

n' = number of duplicate pairs

Reported values for duplicate standard deviations have been treated by robust statistical methods (6)(7). The standard deviation (S_2) of the duplicate difference is also expressed as the coefficient of variation (CV)

$$CV = \frac{S_2}{\bar{X}} \times 100$$

2.0 Quality Control - Microbiology

Sources of error in a microbiological lab often are attributed to lack of implementation of quality control procedures for media preparation and storage, equipment malfunction, inadequate cleansing or sterilization of glassware and impure water supplies. Detailed information regarding the quality control program for these issues are discussed in the LSB publications (8)(9). This report discusses only the quality control procedures that are related directly to sample analysis.

Analyses on microbiological samples for bacteria indicative of pollution require the careful use of methods and techniques by technicians to prevent contamination which will produce either false positive or false negative results. Checks are made to ensure that the analytical procedures are functioning properly and providing the client with results that are both accurate and reproducible within the limits of normal statistical variation. To this end, a series of quality control tests are conducted on a regular basis and their results are monitored so that any irregularities in the test procedures are corrected and false results are not reported.

2.1 Membrane Filtration Test (MF)

2.1.1 Blank Control Filters

Each sample analyzed by the membrane filter test is separated from the previous sample by introducing a control filter at the beginning of each analysis. The control filter is handled in the same manner as those filters used for sample analyses however, only sterile buffered rinse water is filtered. The control filter is placed on the same bacterial medium used for incubation of filters from the next sample, so that all filters are incubated under the same conditions. If any bacteria appear on the control filter, they were likely carried over from the previous sample. No target or indicator organisms and <10 non-target or background organisms should appear on the control filter. If these limits are exceeded, the senior technician/supervisor is consulted. If excessive bias is suspected the result will not be reported.

2.1.2 Duplicate Analyses

Duplicate analyses are conducted at a frequency of one in twenty samples. The data are accumulated for each parameter and a within-run standard deviation is calculated to give a measure of the reproducibility of results. The calculation of the standard deviation is the same as that used in section 1.5 for duplicate analyses-chemistry. A control limit is established based on historical data whereby, the observed differences in duplicate results are sorted according to ranges of colony counts per filter. At present three ranges are used: 0 - 30, 31 - 75, and 76 - 150 colonies per filter. The mean difference within each range is multiplied by 3.267 (3). If the control limit is exceeded the senior technician/supervisor is consulted.

2.1.3 Media Quality Control

A number of checks are made both during and after the preparation of a batch of medium. The pH of a medium is monitored after all the ingredients have been added and again after sterilization has taken place. The final pH may vary within ± 0.2 units from the recommended value. The medium is checked for sterility at both 20°C and 35°C by incubating random samples of either tubes or plates depending on how the medium is dispensed. Any bacterial growth will require re-testing of the medium for sterility. Confirmation of contamination will result in the rejection of the medium for any further use. The batch or lot number of a medium is recorded to determine if any changes in quality occur when batch or lot numbers change.

Differential agar media used in the detection and enumeration of indicator bacteria are tested to ensure their proper functioning. The medium is streaked with both a known target organism or positive culture and a known non-target organism or negative culture. If the medium is functioning properly, growth of the target organism will be abundant after 24 to 48 hours and growth of the non-target organism will not occur or will be minimal even after 72 hours of incubation. The results of all such tests are recorded and any deviations from the expected results will require re-testing or rejection of the medium.

A quantitative QC test of agar media for membrane filter tests involves making up dilute suspensions of the positive and negative cultures. Selected dilutions of these suspensions are passed through membrane filters, which are then placed on plates of both the inhibitory or selective medium and plates of a non-inhibitory or non-selective medium, such as Brain Heart Infusion agar. The positive culture should form approximately the same number of colonies on the selective and non-selective media plates, whereas the negative culture should only form colonies on the non-selective medium. This procedure is conducted on one out ten media batches. Alternatively, one or more samples containing target organisms are filtered in duplicate and respective filters are placed on agar plates from the new and previous batch of medium. Results are recorded and statistically analyzed as for duplicate analyses. Media is re-tested and rejected if it fails to meet the past performance of the previous medium. Results are recorded and statistically analyzed in a manner similar to that for duplicate analyses.

2.2 Presence-Absence (P-A) Tests

2.2.1 Blank Control P-A Bottles

For each group of 21 samples, a blank control is prepared by pouring a 99 mL dilution blank into a P-A bottle and incubating it along with the regular P-A bottles. The P-A blank bottle is incubated for three to four days and should remain free of any bacterial growth or colour change. Growth in more than one P-A blank control test will require rechecking of the sterility of the dilution blanks and P-A medium.

2.2.2 Media Quality Control

A number of checks are performed on the P-A broth including: pH, sterility at 20°C and 35°C, and growth reaction of Escherichia coli (E. coli). If the medium is functioning properly, E. coli will produce a strong acid reaction (yellow colour in the medium) and agitation of the bottle will cause release of the dissolved gas in the medium producing a layer of foam at its surface.

In addition, a quantitative test of the P-A broth is done by pipetting 2 mL of broth onto a filter pad and filtering a suspension of E. coli through a membrane filter, which is then placed on the filter pad saturated with the P-A broth. A second MF is prepared with a similar volume of an E. coli suspension and placed on Brain Heart Infusion agar in a petri dish. Previous testing has shown that E. coli colony counts on both filters should be approximately the same. Quality Control checks on EC broth, Lactose Purple broth, MacConkey agar, Nutrient Gelatin Yeast Extract agar and Mannitol Salt agar include pH readings, sterility and bacterial growth reactions of positive and negative cultures inoculated onto or into each medium. If any Quality Control tests fail, the medium is either re-tested or rejected.

2.2.3 Sample Age

The accurate determination of bacterial numbers for indicator or heterotrophic bacteria in a sample depends on how quickly the sample can be transported to the laboratory for analysis. Water samples should be kept as close to the original water temperature by using a foam-packed container, which includes a central plastic bottle containing water that has been frozen, or by cooling to refrigeration temperatures before shipment to the laboratory. (10)

Samples should arrive at the laboratory on the same day as sampled or, if refrigerated, within 24 hours. For sewage effluent and surface water samples, no analysis will be done if the samples are older than 48 hours; for drinking water samples, the time limit is 72 hours, and for legal samples, it is 24 hours. Limits on the age of samples for analysis must be in place as bacterial numbers in samples may increase or decrease depending on nutrients, toxic elements and the influence of temperature on the metabolic activities of the organisms. The longer the time period between sampling and analysis, the greater the chance for producing either inflated or deflated numbers of organisms per 100 mL of sample.

3.0 FORMAT FOR PERFORMANCE REPORT

A performance report is generated for each test conducted in the Water Quality Section with the exception of those parameters where no data or less than three pieces of data exist for 1989. The performance report is set up alphabetically by the name of the test eg. Total Organic Carbon is filed under the parameter "CARBON". If there are several work stations that perform the same test eg. Alkalinity, then the parameter is filed alphabetically by the test name (ALKT) then by the work station code. Each performance report usually consists of three pages: the test description page, the performance data summary page, and the quality control graphics page. The quality control graphics page may not be included for those parameters that do not use quality control standards. Detailed information concerning each of these pages is outlined next.

3.1 TEST DESCRIPTION PAGE

3.1.1 TITLE:

The name of the test parameter.

3.1.2 IDENTIFICATION:

Laboratory:	Location where the test is performed.
LIS Test Name Code:	LIS code for analysis request.
Work Station Code:	LIS code for sample routing to the work station.
Method Code:	LIS code for the analytical procedure.
Sample Type/Matrix:	The various sample types that can be routed to the work station.
Method Introduced:	Date that the method was implemented at the laboratory.
Units:	Unit of measurement in which the results are reported.
Unit Code:	LIS code for the unit of measurement in which the results are reported.
Supervisor:	Name of supervisor responsible for the designated laboratory.

3.1.3 SAMPLING:

The type of container and preservative (if applicable) that is used and minimum volume of sample that is usually required (10). Any sample preparation that is normally performed in the field, is also indicated.

3.1.4 SAMPLE PREPARATION:

Sample preparation techniques which are usually performed at the laboratory before analysis.

3.1.5 ANALYTICAL PROCEDURE:

Analytical method used to determine the parameter.

3.1.6 INSTRUMENTATION:

Type of instrumentation, used to perform the test. Automated continuous flow systems, consist of a sampler, peristaltic pump, manifold for reagent addition, detection system and a readout system. Microcomputers are used to control the operation of analytical equipment and /or data acquisition.

3.1.7 REPORTING:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (3)(5). The code <W indicates that no measurable response was observed under the test conditions. The reported value indicates the smallest amount that could have been measured under routine conditions. W is smaller than the standard deviation of duplicates near zero. The <T code is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1,2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

3.1.8 CALIBRATION:

The number of standards used to calibrate the analytical system plus blanks if applicable.

3.1.9 CONTROLS:

The calibration, drift, recovery, and interference controls that are used when applicable to ensure that the system is operating properly.

3.1.10 MODIFICATIONS:

Modifications to the test in 1989.

3.1.11 NOTES:

Explanatory notes which may aid the data user in interpreting results and information.

3.2 PERFORMANCE DATA SUMMARY PAGE

3.2.1 TITLE:

The name of the test parameter and work station code and in some cases test code.

3.2.2 QUALITY CONTROL DATA FROM/TO:

The period of time over which data was collected.

3.2.3 LAB:

The laboratory in which the data was collected.

3.2.4 ANALYTICAL RANGE:

The full scale value for the analytical range is given in concentration units.

3.2.5 CALIBRATION CONTROL:

A table for the calibration control standards. The between run standard deviation (S), the within run standard deviation (S_w), the ratio S/S_w , and the ranges for acceptance limits of the control standards sums and differences.

3.2.6 RECOVERIES (Where applicable):

A table for the recovery control standards.

3.2.7 DUPLICATES:

A table of within run duplicate data. The data is sorted into a number of concentration spans. The coefficient of variation (%) is obtained by dividing the mean standard deviation (S_2) for a particular concentration span by the mean concentration of duplicate results in that span and multiplying by 100.

3.2.8 OTHER CHECKS (Where applicable):

A table for other checks.

3.3 QUALITY CONTROL GRAPHICS PAGE

3.3.1 TITLE:

The name of the test parameter, work station code, and units of measurement.

3.3.2 DATE FROM/TO:

Period of time over which data was collected.

3.3.3 CALIBRATION CONTROL:

Calibration control standards sums and differences are plotted on a horizontal scale for the period of data collection (referred to on the graphs as "QUALITY CONTROL SAMPLE A+B" for example). The vertical scale consists of the control limits expressed on either side of the expected value. Control limits were chosen from previous analytical performance when available.

PART 1.0

PERFORMANCE SUMMARIES - CHEMISTRY

***** ACIDITY - GRAN *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/08/82
LIS Test Name Code	: ACDG	Units	: ug/L as H
Work Station Code	: PHACD	Unit Code	: 064801
Method Code	: 001BT5	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene or equivalent

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated with 0.01 N sodium hydroxide to pH >8.3. The titrant is standardized against 0.0005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. Data are subjected to Gran analysis.

N.B. pH and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : LTBL (expected result is 16.6 ug/L as H) plus 2 standards, e.g. QCA

ACIDITY - GRAN - PHACD

QUALITY CONTROL DATA FROM 06/01/89 TO 29/12/89

Lab: Titration

Analytical Range: - to 1000 ug/L as H

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	90	500.0	501.0	1.0	10.91
b :	90	200.0	206.5	6.5	5.87
a+b :	90	700.0	707.5	7.5	14.73
a-b :	90	300.0	294.4	-5.6	9.48

s.d.(AB) Sw(within run): 6.74 S(between runs): 8.81 S/Sw: 1.30

On any given day the calibration is accepted if the values obtained lie within the ranges:

657.7 - 742.3 for A+B
271.8 - 328.2 for A-B

DUPLICATES:

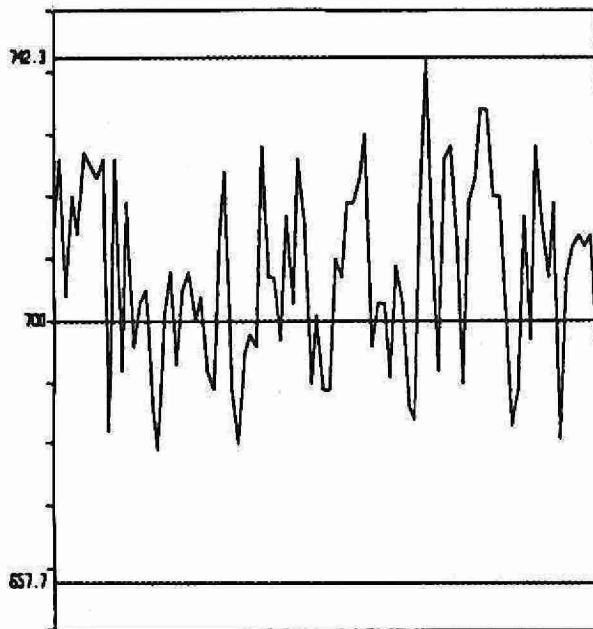
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
55	0	-	40	2.17	7.7
93	40	-	100	2.96	6.9
27	100	-	250	3.18	2.7
4	250	-	500	3.67	1.5
0	500	-	1000	N.A	N.A
179	Overall			2.73	

OTHER CHECKS:

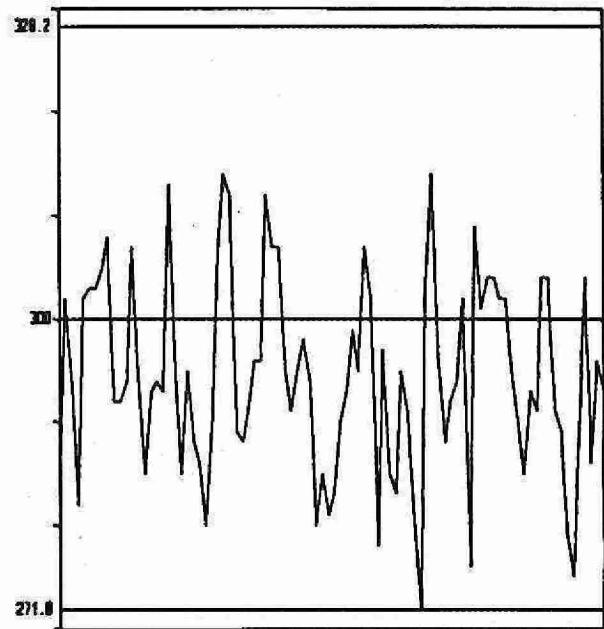
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	88	15.821	3.718

ACIDITY - GRAN - PHACD (UG/L AS H)

QUALITY CONTROL DATA FROM 06/01/89 TO 29/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** ACIDITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: ACDT	Units	: mg/L as CaCO ₃
Work Station Code	: PHACD	Unit Code	: 064915
Method Code	: 001BT2	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow, Domestic Waters, Rivers, Lakes (by special request: Industrial Waste, Sewage)		

SAMPLING:

Quantity Required	: 15 mL
Container	: Polystyrene or equivalent

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated in an automated system with 0.01 N sodium hydroxide to pH >8.3. The titrant is standardized against 0.005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration:	LTBL plus 2 standards, e.g. QCA
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ACIDITY - PHACD

QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89

Lab: Titration

Analytical Range: - to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	89	25.0	25.1	0.1	0.55
b :	89	10.0	10.4	0.4	0.31
a+b :	89	35.0	35.4	0.4	0.75
a-b :	89	15.0	14.7	-0.3	0.49

s.d.(AB) Sw(within run): 0.35 S(between runs): 0.45 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.57 - 37.43 for A+B
13.38 - 16.62 for A-B

DUPLICATES:

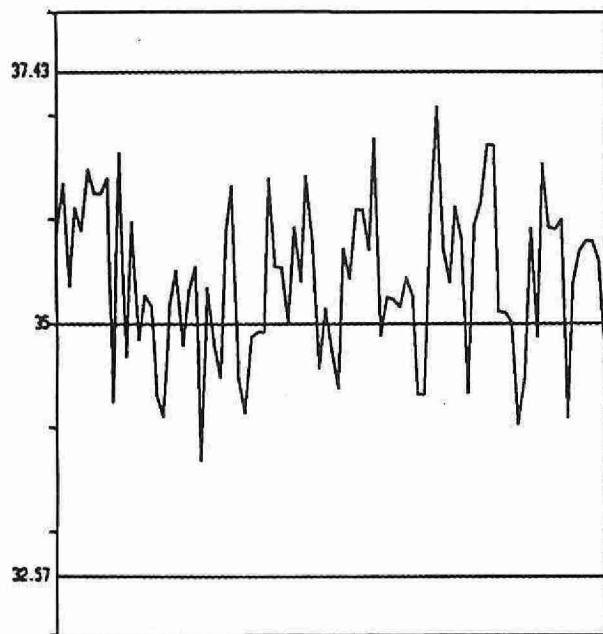
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
48	0.0 - 2.0	0.094	6.4
99	2.0 - 5.0	0.138	4.9
28	5.0 - 10.0	0.149	2.9
4	10.0 - 25.0	0.249	3.3
0	25.0 - 100.0	N.A	N.A
179	Overall	0.128	

OTHER CHECKS:

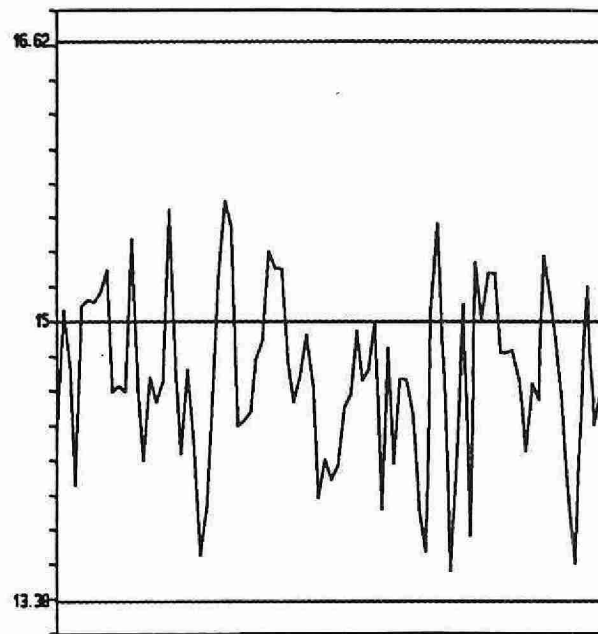
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	87	0.83	0.141

ACIDITY - PHACD (MG/L AS CaCO_3)

QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** ALKALINITY *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL
Container : 250 mL Amber polyethylene bottle filled to the brim;
: screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 2 standard buffers - 2 times daily

ALKALINITY - DOT

QUALITY CONTROL DATA FROM 04/01/89 TO 21/12/89

Lab: Dorset

Analytical Range: - to 80.00 mg/l as CaCO_3

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	208	20.0	19.9	0.1	0.18
b :	208	5.0	4.9	0.1	0.10
a+b :	208	25.0	24.8	0.2	0.25
a-b :	208	15.0	15.0	0.0	0.16

s.d.(AB) Sw(within run): 0.09 S(between runs): 0.11 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.28 - 26.72 for A+B
13.50 - 16.50 for A-B

DUPLICATES:

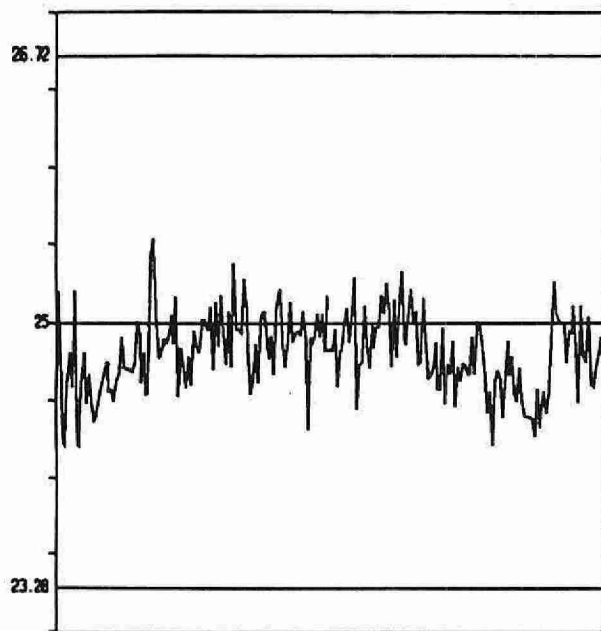
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
270	0.0 - 5.0	0.098	3.2
174	5.0 - 10.0	0.093	2.3
89	10.0 - 80.0	0.120	0.6
533	Overall	0.010	

OTHER CHECKS:

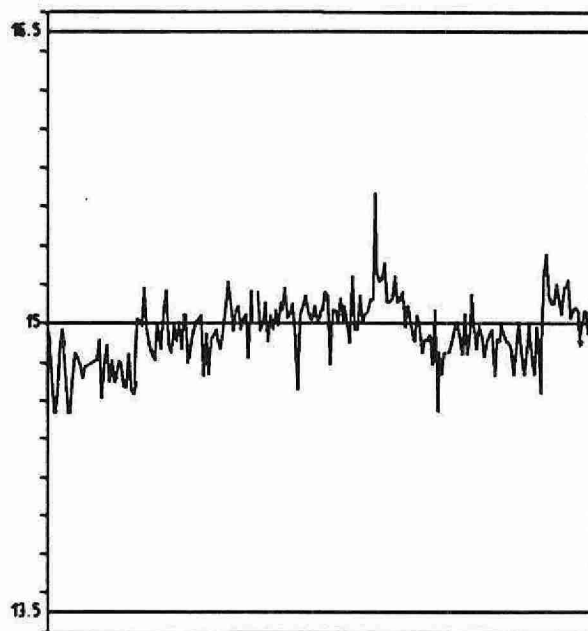
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	209	1.537	0.181

ALKALINITY - DOT (MG/L AS CaCO3)

QUALITY CONTROL DATA FROM 04/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** ALKALINITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. pH, Gran alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 4 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

ALKALINITY - RATS

QUALITY CONTROL DATA FROM 10/01/89 TO 20/12/89

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	88	250.0	249.8	0.2	2.04
b :	88	50.0	49.2	0.8	0.91
a+b :	88	300.0	299.0	1.0	2.59
a-b :	88	200.0	200.6	-0.6	1.82
c :	88	10.0	9.8	0.2	0.23
d :	88	2.5	2.4	0.1	0.11
c+d :	88	12.5	12.2	0.3	0.29
c-d :	88	7.5	7.3	0.2	0.22

s.d.(AB) Sw(within run): 1.28 S(between runs): 1.58 S/Sw: 1.23

s.d.(CD) Sw(within run): 0.15 S(between runs): 0.18 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

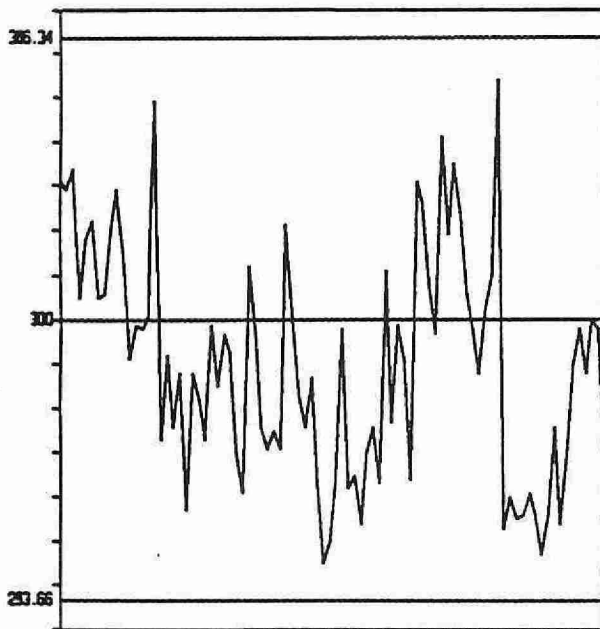
293.66	-	306.35	for	A+B
195.77	-	204.23	for	A-B
11.67	-	13.33	for	C+D
6.95	-	8.05	for	C-D

DUPLICATES:

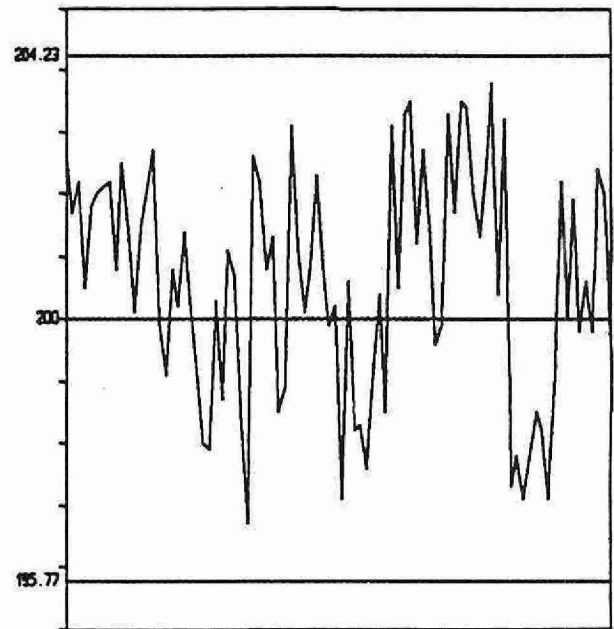
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
13	0	-	4	0.212	8.5
35	4	-	50	0.338	4.0
32	50	-	100	0.918	1.4
90	100	-	200	1.324	1.0
57	200	-	350	1.481	1.9
0	350	-	1000	N.A	N.A
227	Overall			1.099	

ALKALINITY - RATS (MG/L AS CaCO₃)

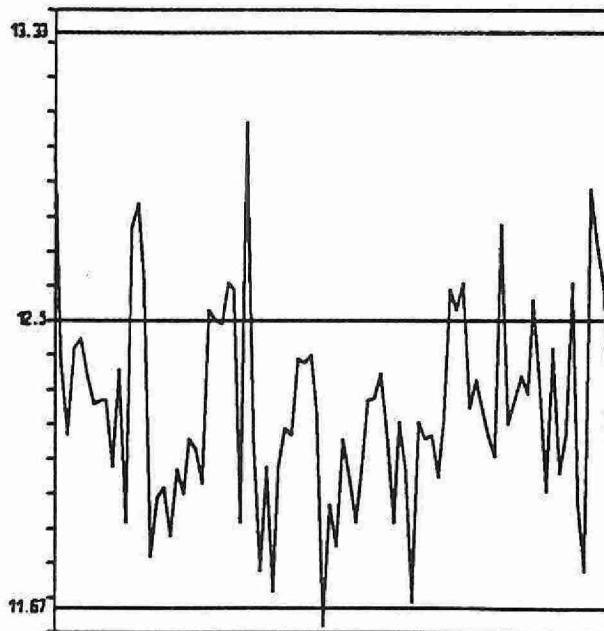
QUALITY CONTROL DATA FROM 10/01/89 TO 20/12/89



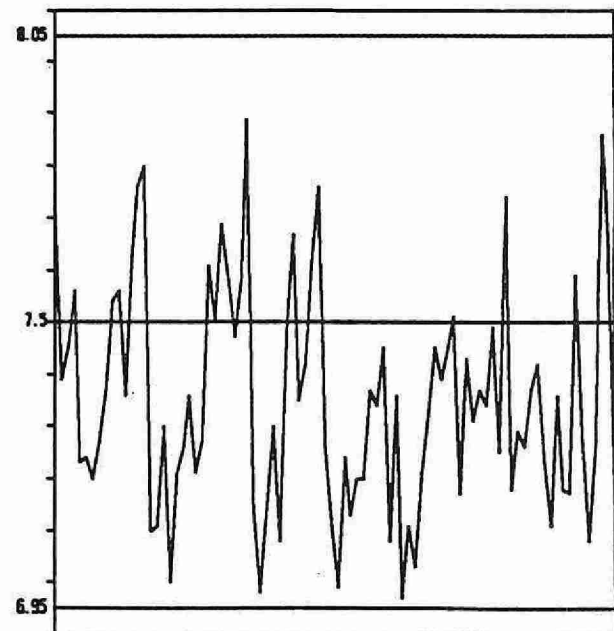
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** ALKALINITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

pH, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

ALKALINITY - WATS

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89

Lab: Colourimetry

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	106	250	250.31	-0.31	2.034
b :	106	100	101.09	-1.09	1.439
a+b :	106	350	351.40	-1.40	2.862
a-b :	106	150	149.22	0.78	2.057
c :	106	100	100.12	-0.12	1.139
d :	106	25	25.15	-0.15	0.513
c+d :	106	125	125.27	-0.27	1.419
c-d :	106	75	74.97	0.03	1.052

s.d.(AB) Sw(within run): 1.45 S(between runs): 1.76 S/Sw: 1.21

s.d.(CD) Sw(within run): 0.74 S(between runs): 0.88 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

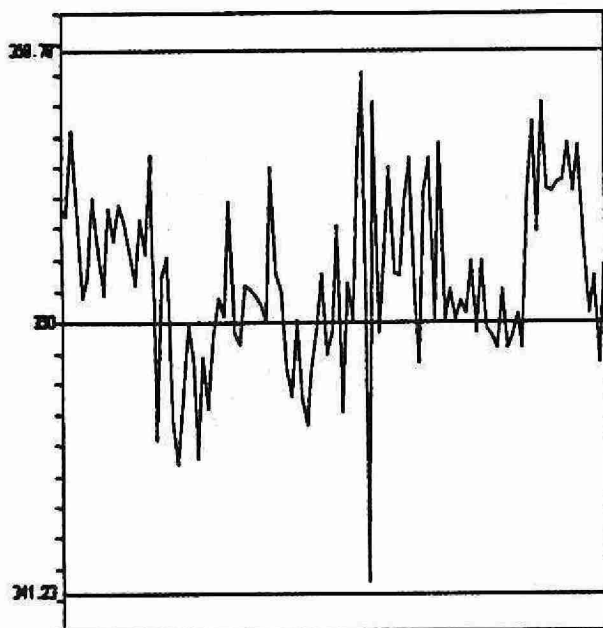
341.23	-	358.78	for	A+B
144.15	-	155.85	for	A-B
119.20	-	130.80	for	C+D
71.13	-	78.87	for	C-D

DUPLICATES:

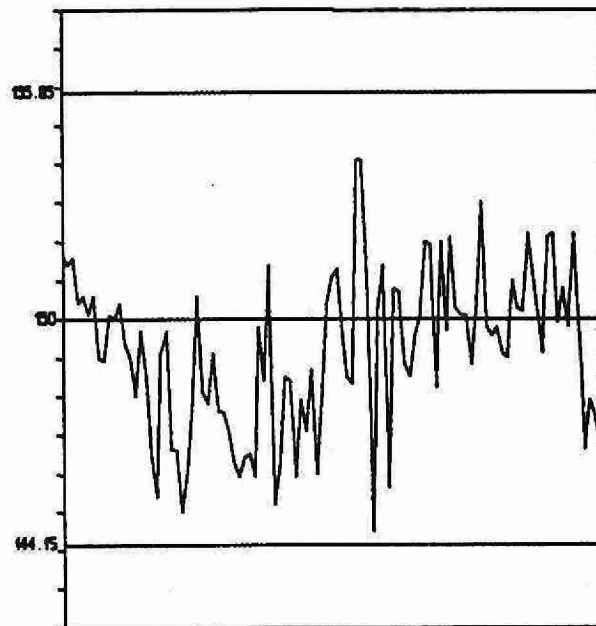
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
12	0.0	-	25.0	0.438	4.4
102	25.0	-	100.0	1.071	1.3
154	100.0	-	500.0	2.329	6.5
268	Overall			1.683	

ALKALINITY - WATS (MG/L AS CaCO3)

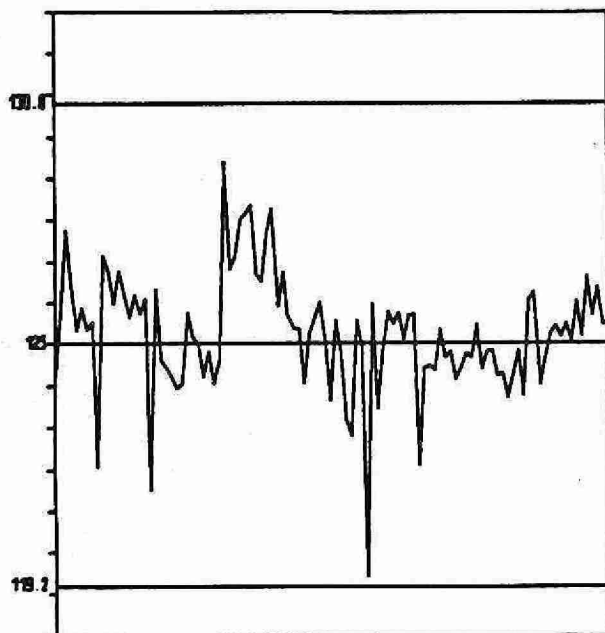
QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89



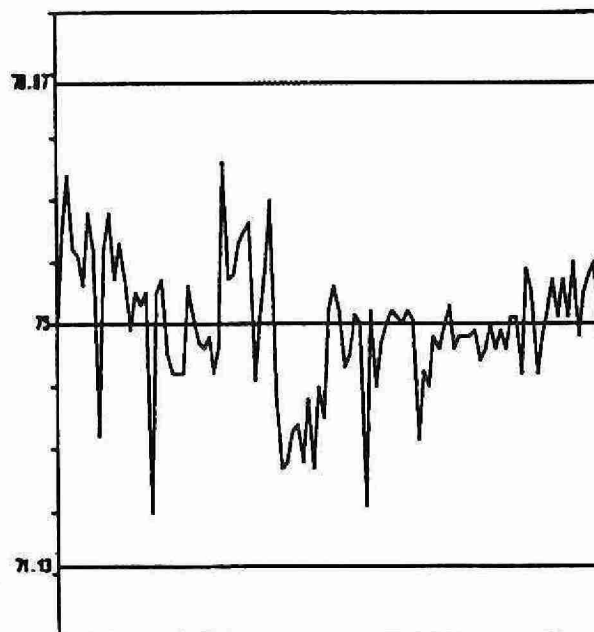
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** ALKALINITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before 1980
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WQSDIRT	Unit Code	: 064915
Method Code	: 003MT3	Supervisor	: F. Lo
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are pipetted manually (50.0 mL) and titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. Analysis is performed on the supernatant or filtrate.

INSTRUMENTATION:

Automated modular titration system .

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA

ALKALINITY - WQSDIRT

QUALITY CONTROL DATA FROM 03/01/89 TO 18/12/89

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	44	570.0	567.6	-2.4	3.99
b :	44	114.0	114.6	0.6	0.93
a+b :	44	684.0	682.2	-1.8	4.37
a-b :	44	456.0	453.1	-2.9	3.81

s.d.(AB) Sw(within run): 2.69 S(between runs): 2.90 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

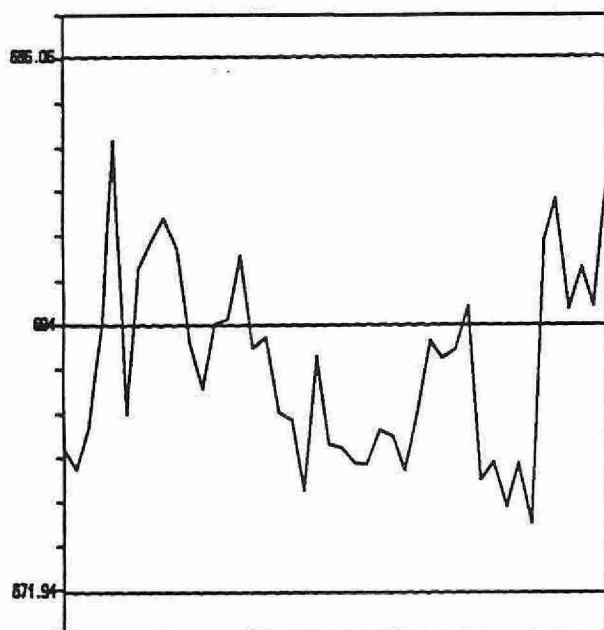
671.94 - 696.06 for A+B
447.96 - 464.04 for A-B

DUPLICATES:

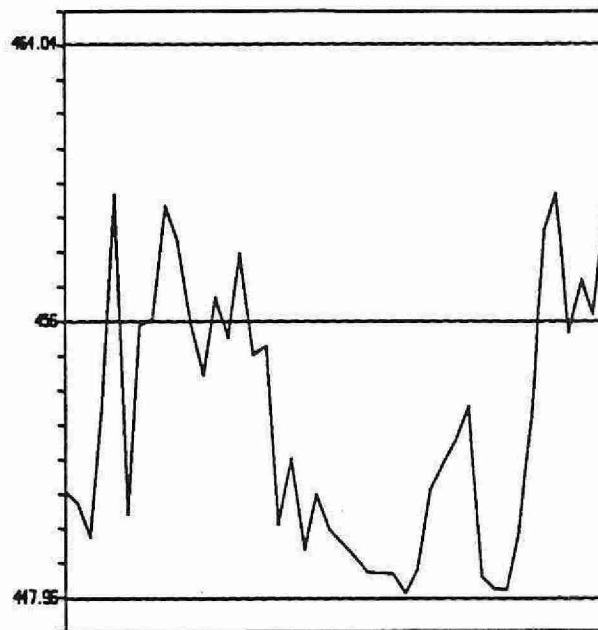
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
17	0 - 150	0.36	1.1
32	150 - 250	0.90	1.1
22	250 - 500	2.01	0.9
11	500 - 1000	4.65	1.3
82	Overall	1.29	

ALKALINITY - WQSDIRT (MG/L AS CaCO_3)

QUALITY CONTROL DATA FROM 03/01/89 TO 18/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** ALKALINITY - GRAN *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T6	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required: 150 mL

Container: 250 mL Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH <3.7. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.

N.B. pH is determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

Drift : 2 standard buffers - 2 times daily

ALKALINITY - GRAN - DOT

QUALITY CONTROL DATA FROM 04/01/89 TO 21/12/89

Lab: Dorset

Analytical Range: - to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	205	20.00	20.06	0.06	1.426
b :	205	5.00	5.00	0.00	0.424
a+b :	205	25.00	25.06	0.06	1.814
a-b :	205	15.00	15.06	0.06	1.068

s.d.(AB) Sw(within run): 0.75 S(between runs): 1.05 S/Sw: 1.39

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.28 - 26.72 for A+B
13.85 - 16.15 for A-B

DUPLICATES:

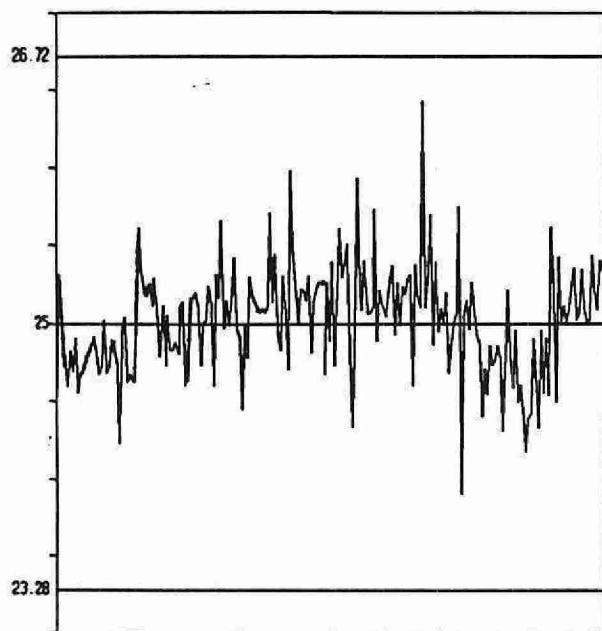
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
214	-10.0	-	2.0	0.134	175.5
179	2.0	-	5.0	0.121	6.1
93	5.0	-	10.0	0.144	2.2
49	10.0	-	25.0	0.196	1.5
535	Overall			0.137	

OTHER CHECKS:

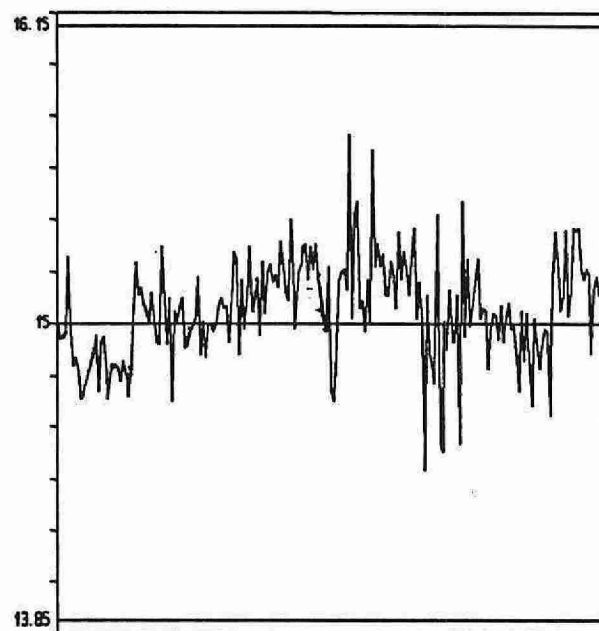
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	205	-0.28	0.280

ALKALINITY - GRAN - DOT (MG/L AS CaCO3)

QUALITY CONTROL DATA FROM 04/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** ALKALINITY - GRAN ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.
pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: N/A T value: N/A

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : BL plus two standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

ALKALINITY - GRAN - RATS

QUALITY CONTROL DATA FROM 02/02/89 TO 01/12/89

Lab: Colourimetry

Analytical Range: - to 0.1 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	61	10.0	9.901	-0.101	0.23
d :	61	2.5	2.499	-0.001	0.12
c+d :	61	12.5	12.400	-0.100	0.30
c-d :	61	7.5	7.402	-0.102	0.21

s.d.(CD) Sw(within run): 0.15 S(between runs): 0.18 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

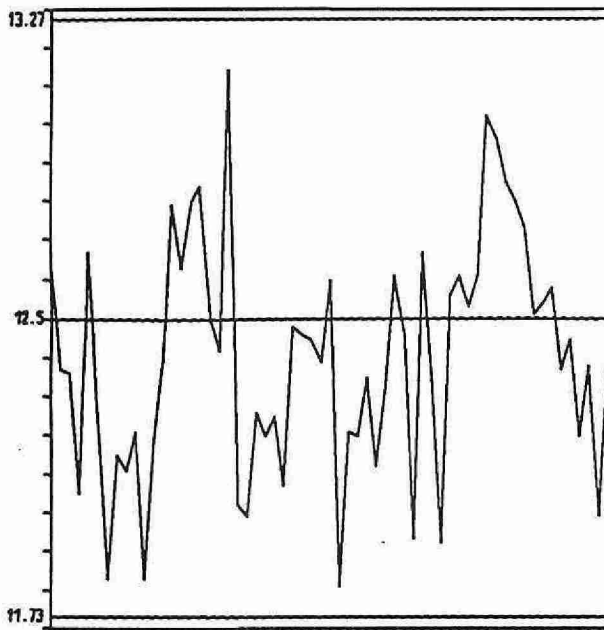
11.73 - 13.27 for C+D
6.99 - 8.01 for C-D

DUPLICATES:

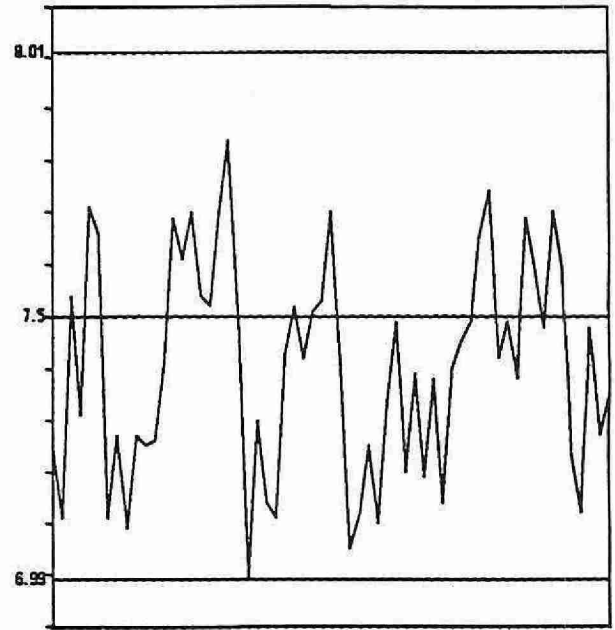
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
11	-3.0 - 5.0	0.206	15.0
8	5.0 - 10.0	0.302	5.7
6	10.0 - 100.0	0.619	0.5
25	Overall	0.295	

ALKALINITY - GRAN - RATS

QUALITY CONTROL DATA FROM 02/02/89 TO 01/12/89



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** EXTRACTABLE ALUMINUM - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALECA	Units	: ug/g as Al (dried)
Work Station Code	: DOSOLAL	Unit Code	: 073813
Method Code	: 3144A5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g (dry <2 mm)
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 10 g sample plus 20 mL 0.01 M calcium chloride is agitated for 5 minutes, centrifuged and filtered. The filtration is analyzed for Al by AAS at 309.3 nm using an NO₂-acetylene flame.
Approximate absorbance: 0.1 at the full scale level

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types plus two solution controls at 10% and 30% of full scale and two method blanks.

Drift: BL plus 1 standard (100%) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM - DOSOLAL

QUALITY CONTROL DATA FROM 30/03/89 TO 26/10/89

Lab: Dorset Soils

Analytical Range: - to 40.0 ug/g as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	23	30.0	29.7	-0.3	0.82
b :	23	10.0	9.6	-0.4	0.44
a+b :	23	40.0	39.3	-0.7	1.05
a-b :	23	20.0	20.1	0.1	0.80

s.d.(AB) Sw(within run): 0.57 S(between runs): 0.66 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

35.2 - 44.8 for A+B
16.8 - 23.2 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	23	3.20	0.59
R2 :	23	12.46	0.95
R2 :	23	28.42	3.47

DUPLICATES:

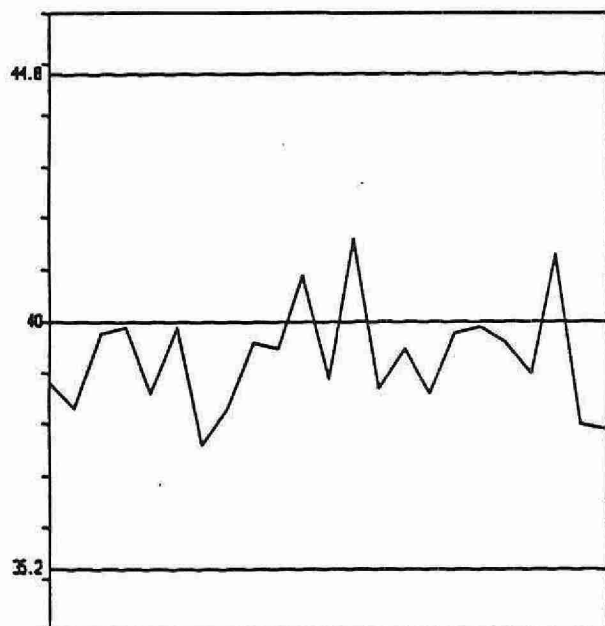
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.0 - 1.0	0.28	53.8
25	1.0 - 10.0	0.96	18.0
17	10.0 - 40.0	1.49	1.4
51	Overall	0.97	

OTHER CHECKS:

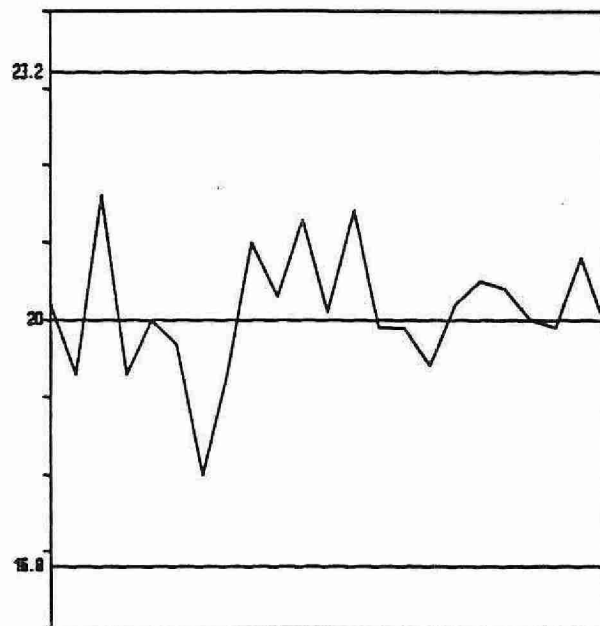
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	23	0.07	0.19

EXTRACTABLE ALUMINUM - SOIL - DOSOLAL (UG/G AS AL)

QUALITY CONTROL DATA FROM 30/03/89 TO 26/10/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** EXTRACTABLE ALUMINUM - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEDI	Units	: % by weight Al
Work Station Code	: DOMETDI	Unit Code	: 070813
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500um (35 mesh)

ANALYTICAL PROCEDURE:

Aluminum is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron (and Manganese, when required) is determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; two QC solutions at 25% and 75% of full scale, 2 method blanks; round robin ECSS samples (run occasionally).

Drift: BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

EXTRACTABLE ALUMINUM - DOMETDI

QUALITY CONTROL DATA FROM 31/01/89 TO 02/11/89

Lab: Dorset Soils

Analytical Range: - to 1.00 % by wt Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	0.75	0.752	0.002	0.0083
b :	5	0.25	0.248	-0.002	0.0164
a+b :	5	1.00	1.00	0.000	0.0245
a-b :	5	0.50	0.504	0.004	0.0089

s.d.(AB) Sw(within run): 0.006 S(between runs): 0.013 S/Sw: 2.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 - 1.07 for A+B
0.45 - 0.55 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	0.34	0.016
R2 :	5	0.57	0.034
R3 :	5	0.37	0.023

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.00 - 0.20	0.008	5.3
3	0.20 - 0.50	0.017	4.2
2	0.50 - 1.00	0.011	N.A.
12	Overall	0.039	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	5	-0.002	0.0045

***** EXTRACTABLE ALUMINUM - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: ALEOX	Units	: % by wt as Al
Work Station Code	: DOMETOX	Unit Code	: 070813
Method Code	: 302AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2 mm. A subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275

REPORTING:

Maximum Significant Figures: 2

Current W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three long term soil samples, representing different soil types, 2 method blanks, QC solutions at 25% and 75% of scale, round robin ECSS samples.

Drift: BL plus 1 standard (100% F.S.) every 10 samples.

EXTRACTABLE ALUMINUM - DOMETOX

QUALITY CONTROL DATA FROM 27/01/89 TO 03/11/89

Lab: Dorset Soils

Analytical Range: - to 2.00 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	3	1.50	1.53	0.03	0.025
b :	3	0.50	0.51	0.01	0.045
a+b :	3	2.00	2.03	0.03	0.070
a-b :	3	1.00	1.02	0.02	0.020

s.d.(AB) Sw(within run): 0.014 S(between runs): 0.036 S/Sw: 2.58

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.70 - 2.30 for A+B
0.80 - 1.20 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.463	0.045
R2 :	3	1.027	0.059
R3 :	3	0.737	0.061

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
3	0.00 - 0.40	0.049	24.1
2	0.40 - 1.00	0.027	N.A
0	1.00 - 2.00	N.A	N.A
5	Overall	0.041	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0	0

*** EXTRACTABLE ALUMINUM - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEPY	Units	: % by weight Al
Work Station Code	: DOMETALX	Unit Code	: 070813
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500 um (35 mesh)

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples.

Drift: BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

EXTRACTABLE ALUMINUM - DOMETALX

QUALITY CONTROL DATA FROM 26/01/89 TO 01/11/89

Lab: Dorset Soils

Analytical Range: - to 0.50 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	0.375	0.368	-0.007	0.008
b :	5	0.125	0.122	-0.003	0.008
a+b :	5	0.500	0.490	-0.010	0.016
a-b :	5	0.250	0.246	-0.004	0.005

s.d.(AB) Sw(within run): 0.004 S(between runs): 0.008 S/Sw: 2.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.46 - 0.54 for A+B
0.23 - 0.27 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	0.48	0.013
R2 :	4	0.32	0.026
R3 :	4	0.24	0.015

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.00 - 0.10	0.007	8.3
5	0.10 - 0.25	0.011	6.6
9	0.25 - 0.50	0.020	5.8
18	Overall	0.015	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	5	0.322	0.177

*** EXCHANGEABLE ALUMINUM - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALESC	Units	: meq/100 g
Work Station Code	: DOCACTION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Al by AAS at 309.3 nm with a NO₂-acetylene flames. Approximate absorbance: 0.2 at the full scale level.
N.B. Calcium, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K. Values for recoveries are unknown - average value used.

EXCHANGEABLE ALUMINUM - DLOCATION

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	28	1.88	1.88	0.00	0.035
b :	28	0.63	0.61	0.02	0.041
a+b :	28	2.51	2.49	0.02	0.065
a-b :	28	1.25	1.27	-0.02	0.040

s.d.(AB) Sw(within run): 0.028 S(between runs): 0.038 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.24 - 2.78 for A+B
1.06 - 1.44 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	28	1.472	0.096
R2 :	28	0.221	0.061
R2 :	28	0.035	0.021

DUPLICATES:

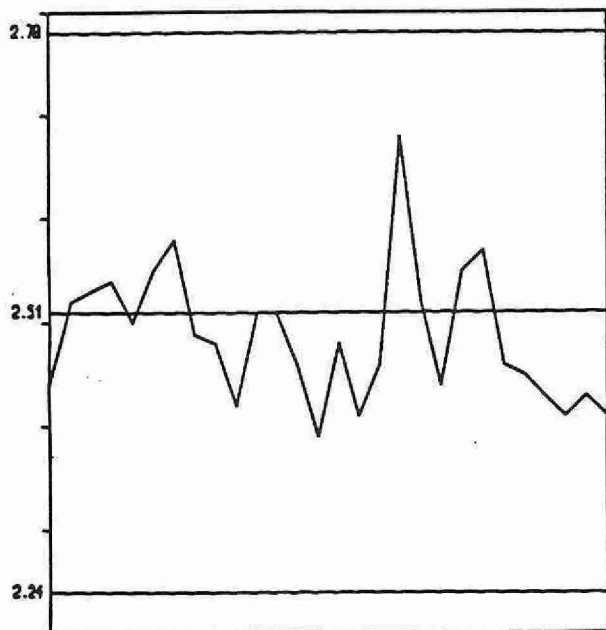
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
25	0.00 - 0.50	0.025	31.5
10	0.50 - 1.25	0.058	6.1
26	1.25 - 2.50	0.075	4.3
61	Overall	0.053	

OTHER CHECKS:

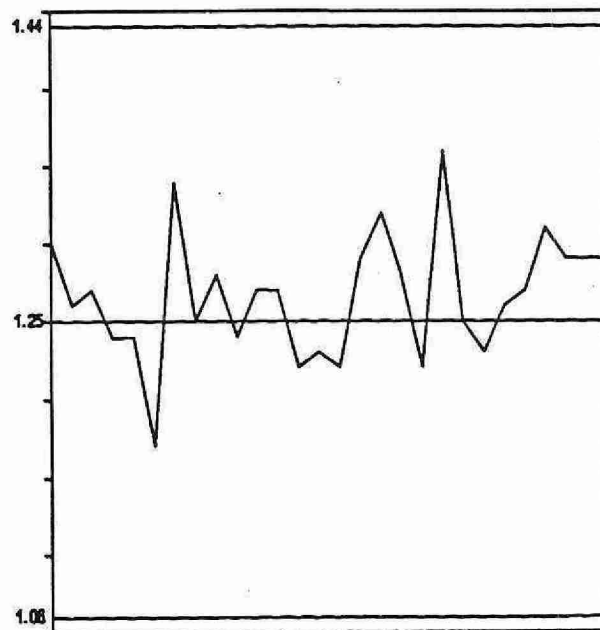
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	28	-0.001	0.0099

EXCHANGEABLE ALUMINUM - SOIL - LOCATION (MEQ/100 G)

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** ALUMINUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 24/10/85
LIS Test Name Code	: ALEXCV,ALNDCV	Units	: ug/L as Al
Work Station Code	: DOALSP	Unit Code	: 063813
Method Code	: 0928C2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required : 30 mL
Container : PET - 500 mL Jars

ANALYTICAL PROCEDURE:

The procedure is based on the formation of an aluminum catechol-violet complex at pH 6.2. Phenanthroline hydroxylamine HCl reagents are used to reduce interference by iron. An ion exchange column is used for separating organic and inorganic aluminum. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards and reported as ug/L as CV reactive Al.

INSTRUMENTATION:

Automated auto-analyzer/sampler system with colourimeter and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 10 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA
Drift : BL every 10 samples and BL plus check standard every 20 samples

ALUMINUM - DOALSP

QUALITY CONTROL DATA FROM 09/01/89 TO 27/12/89

Lab: Dorset

Analytical Range: - to 1000 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	89	750.0	746.2	-3.8	7.60
b :	89	250.0	253.2	3.2	5.68
a+b :	89	1000.0	999.4	-0.6	10.30
a-b :	89	500.0	492.9	-7.1	8.71
c :	88	75.0	76.3	1.3	2.00
d :	88	25.0	28.2	3.2	3.08
c+d :	89	100.0	104.4	4.4	4.06
c-d :	89	50.0	48.1	-1.9	3.23

s.d.(AB) Sw(within run): 6.16 S(between runs): 6.71 S/Sw: 1.09

s.d.(CD) Sw(within run): 2.29 S(between runs): 2.60 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

963	-	1037	for	A+B
475	-	525	for	A-B
85	-	115	for	C+D
40	-	60	for	C-D

DUPLICATES:

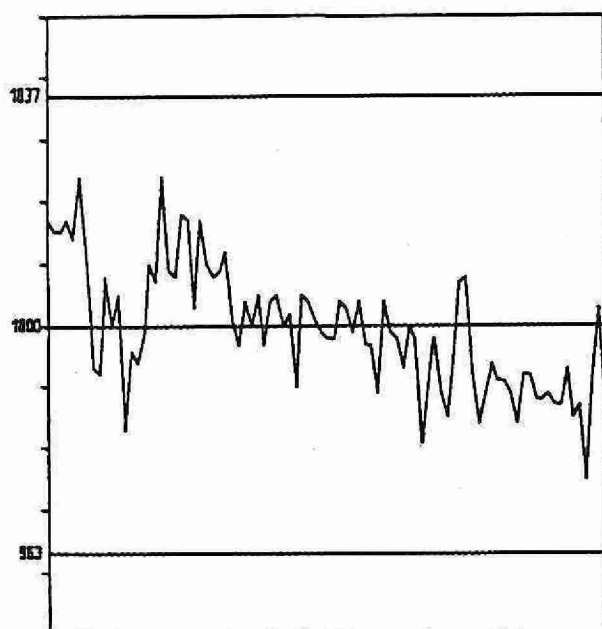
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
108	0	-	50	1.93	12.2
64	50	-	100	3.12	5.0
46	100	-	250	12.47	10.2
30	250	-	500	20.26	5.8
13	500	-	1000	25.33	3.1
261	Overall			5.06	

OTHER CHECKS:

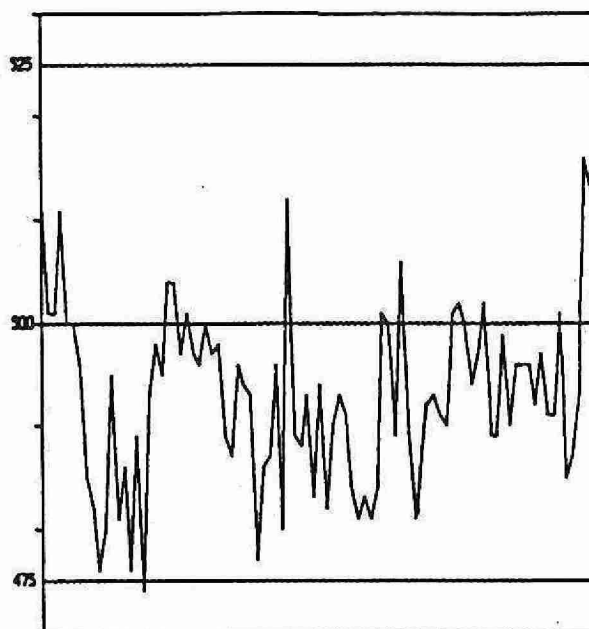
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	71	0.042	0.356
Standard Calibration	27	100	0

ALUMINUM - DOALSP (UG/L AS AL)

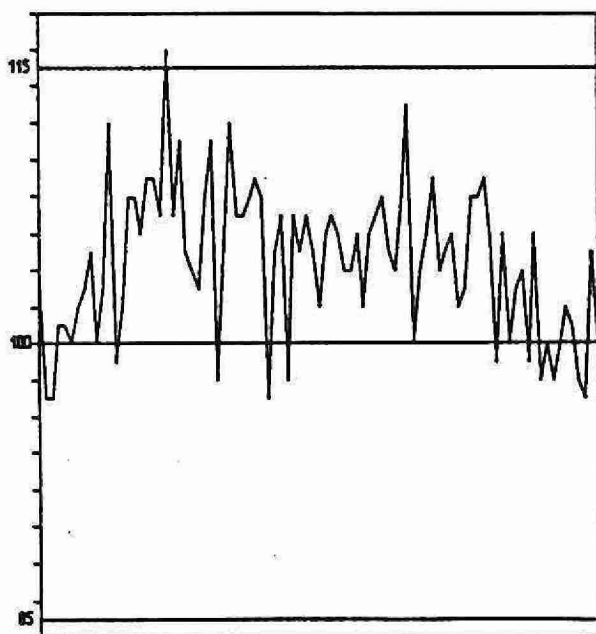
QUALITY CONTROL DATA FROM 09/01/89 TO 27/09/89



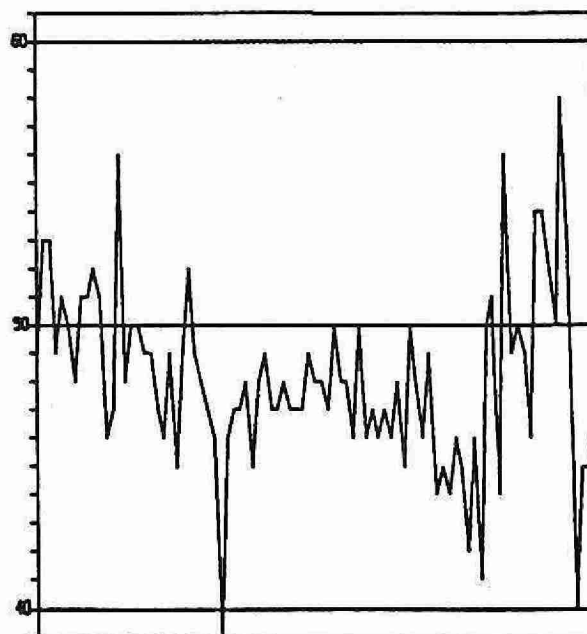
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** TOTAL ALUMINUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 06/09/83
LIS Test Name Code	: ALUT	Units	: ug/L as Al
Work Station Code	: DOAAS	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation, Biota and Groundwaters		

SAMPLING:

Quantity Required	: 1 mL
Container	: 15 mL Polystyrene Tube, capped

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 309.3 nm.
Approximate absorbance: .5 at the full scale level

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

BL plus 5 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

TOTAL ALUMINUM-DOAAS

QUALITY CONTROL DATA FROM 16/01/89 TO 18/12/89

Lab: Dorset

Analytical Range: - to 200 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	76	140.0	134.21	-5.79	5.41
b :	76	70.0	69.53	-0.47	4.46
a+b :	76	210.0	203.74	-6.26	7.42
a-b :	76	70.0	64.68	-5.32	6.58
c :	73	35.0	38.05	3.05	2.96
d :	73	7.0	6.45	-0.55	1.57
c+d :	73	42.0	44.51	2.51	3.53
c-d :	73	28.0	31.60	3.60	3.16

s.d.(AB) Sw(within run): 4.65 S(between runs): 4.96 S/Sw: 1.07

s.d.(CD) Sw(within run): 2.23 S(between runs): 2.37 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

180	-	240	for	A+B
50	-	90	for	A-B
27	-	57	for	C+D
18	-	38	for	C-D

DUPLICATES:

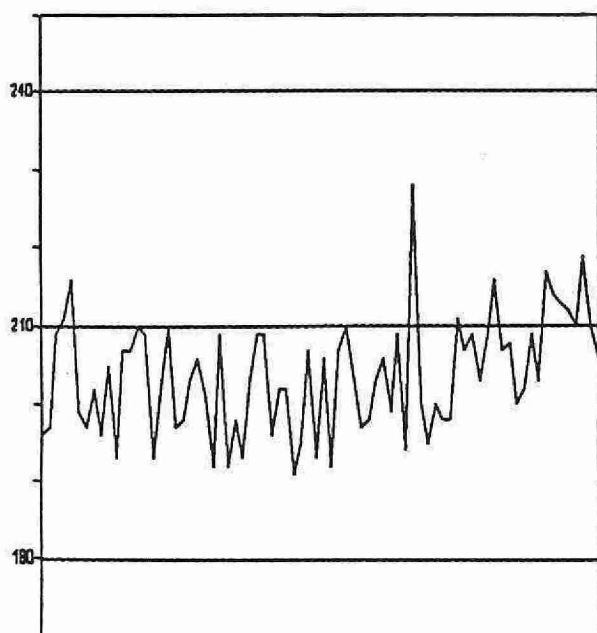
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
17	0.0	-	10.0	1.76	29.7
15	10.0	-	25.0	3.61	19.2
62	25.0	-	100.0	6.52	10.9
54	100.0	-	200.0	9.59	6.7
148	Overall			7.28	

OTHER CHECKS:

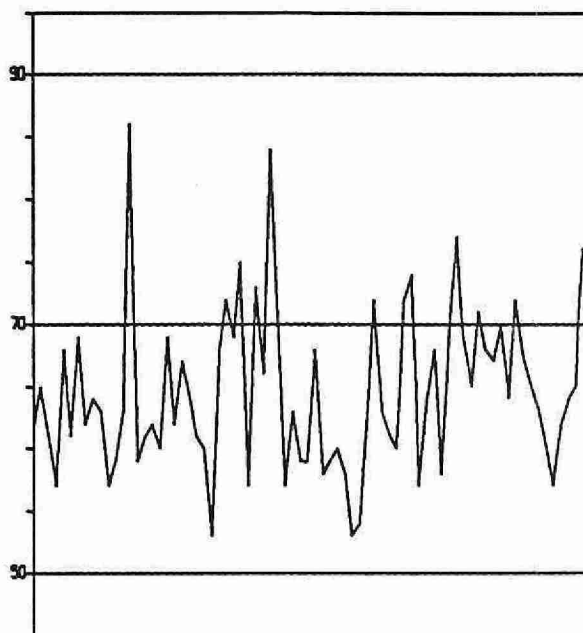
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	76	0	0
Absorbance	76	406.5	50.99

TOTAL ALUMINUM - DOAAS (UG/L AS AL)

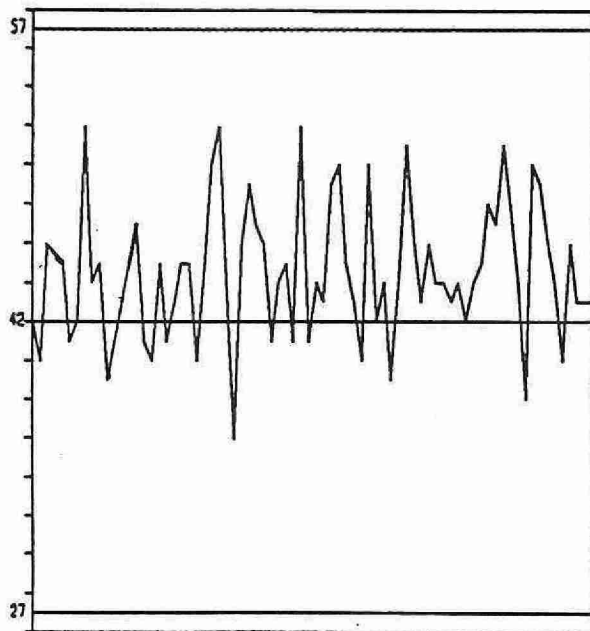
QUALITY CONTROL DATA FROM 16/01/89 TO 18/12/89



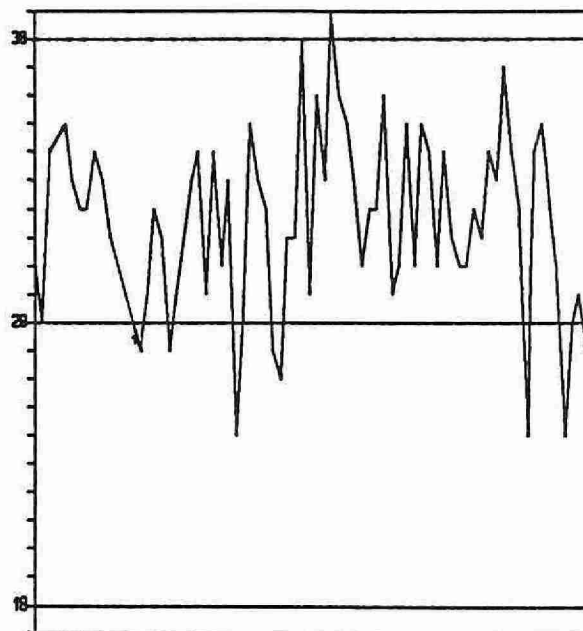
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** TOTAL CADMIUM *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/11/84
LIS Test Name Code	: CDUT	Units	: ug/L as Cd
Work Station Code	: DOAAS	Unit Code	: 063848
Method Code	: 005AF2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 1 mL
Container : 500 mL acid washed Teflon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 228.8 nm.
Approximate absorbance: .400 at the full scale level

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 4 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

TOTAL CADMIUM - DOAAS

QUALITY CONTROL DATA FROM 05/01/89 TO 13/12/89

Lab: Domestic Water

Analytical Range: - to 2.000 ug/l as Cd

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	27	0.600	0.500	-0.100	0.0867
b :	27	0.160	0.188	0.028	0.0346
a+b :	27	0.760	0.689	-0.071	0.0994
a-b :	27	0.440	0.312	-0.128	0.0869
c :	27	0.160	0.187	0.027	0.0345
d :	27	0.060	0.057	-0.003	0.0202
c+d :	27	0.220	0.246	0.026	0.0426
c-d :	27	0.100	0.132	0.032	0.0369

s.d.(AB) Sw(within run): 0.061 S(between runs): 0.066 S/Sw: 1.07

s.d.(CD) Sw(within run): 0.026 S(between runs): 0.028 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.37	-	1.15	for	A+B
0.18	-	0.70	for	A-B
0.05	-	0.39	for	C+D
-0.01	-	0.21	for	C-D

DUPLICATES:

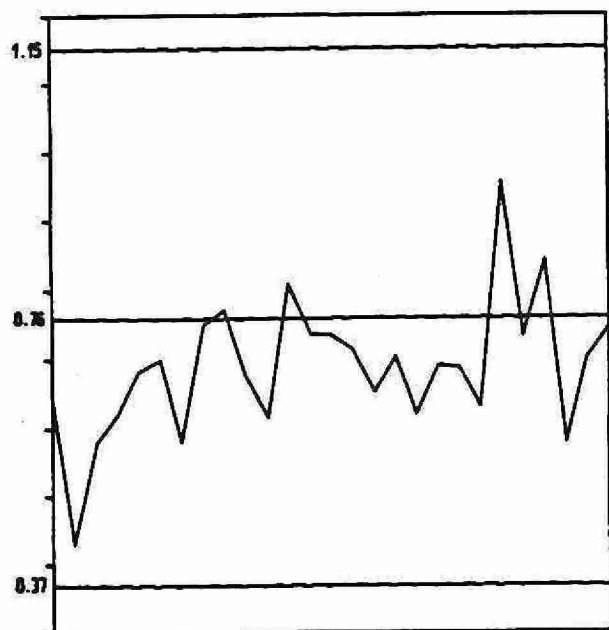
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.000 - 0.025	0.014	157.1
27	0.025 - 0.100	0.016	28.1
28	0.100 - 0.500	0.020	14.5
2	0.500 - 2.000	0.328	N.A.
63	Overall	0.019	

OTHER CHECKS:

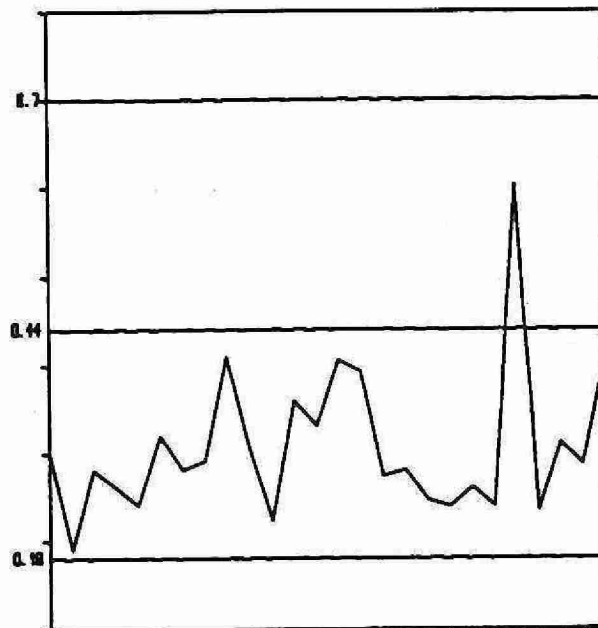
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	28	0.002	0.0058
Absorbance	28	378.8	154.6

TOTAL CADMIUM - DOAAS (UG/L AS Cd)

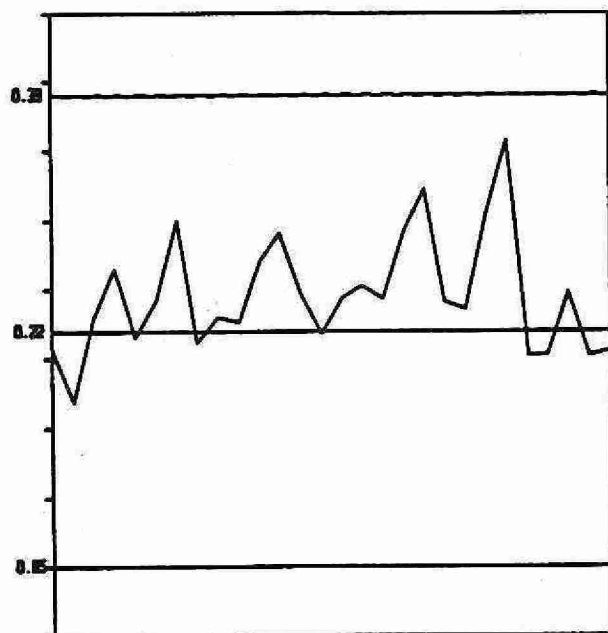
QUALITY CONTROL DATA FROM 05/01/89 TO 13/12/89



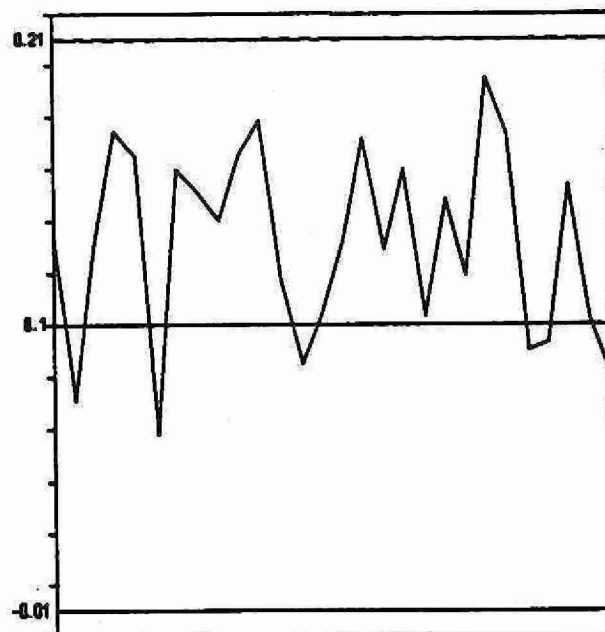
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** EXCHANGEABLE CALCIUM - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CAESC	Units	: meq/100 g
Work Station Code	: DOCAION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Ca by AAS at 422.7 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level.

Aluminum, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).

Drift: BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

EXCHANGEABLE CALCIUM - DOLOCATION

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89

Lab: Dorset Soils

Analytical Range: - to 5.0 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	28	3.75	3.75	0.00	0.068
b :	28	1.25	1.23	-0.02	0.041
a+b :	28	5.00	4.98	-0.02	0.095
a-b :	28	2.50	2.52	0.02	0.060

s.d.(AB) Sw(within run): 0.042 S(between runs): 0.056 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.63 - 5.37 for A+B
2.25 - 2.75 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	28	2.96	0.214
R2 :	26	1.78	0.122
R3 :	28	0.55	0.040

DUPLICATES:

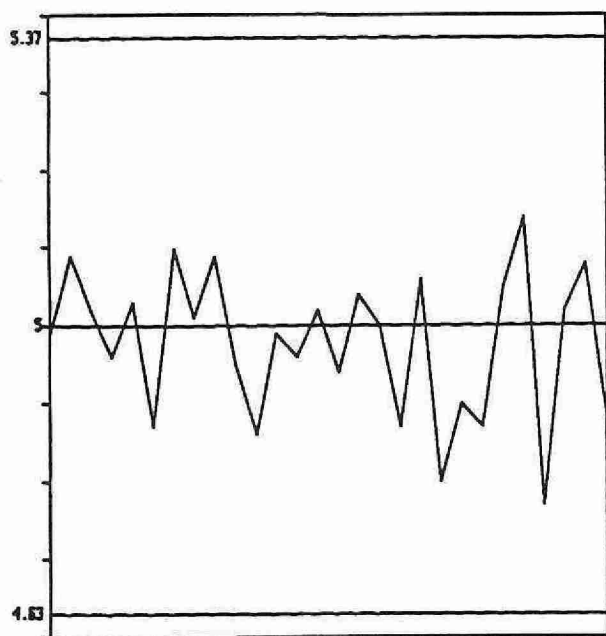
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.0 - 1.0	0.039	5.0
20	1.0 - 2.5	0.112	6.0
49	2.5 - 5.0	0.142	4.0
77	Overall	0.123	

OTHER CHECKS:

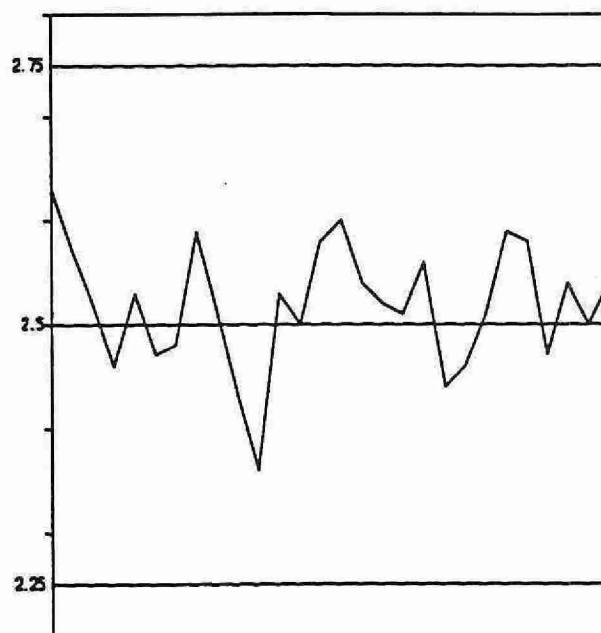
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	28	0.003	0.008

EXCHANGEABLE CALCIUM - SOIL - LOCATION (MEQ/100 G)

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAA	Unit Code	: 064820
Method Code:	: 002CA1	Supervisor	: M. Young
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g., QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

27/11/89 - Analytical System switched to SpectrAA-400, an automated AAS with an IBM PC/2 Model 30 computer to provide instrument control, data processing and mainframe communications, with BL plus 5 standards

CALCIUM - PRAA

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89

Lab: Atomic Absorption

Analytical Range: - to 2.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	76	1.20	1.204	0.004	0.016
b :	76	0.20	0.198	-0.002	0.007
a+b :	76	1.40	1.402	0.002	0.019
a-b :	76	1.00	1.005	0.005	0.017

s.d.(AB) Sw(within run): 0.012 S(between runs): 0.013 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.31 - 1.49 for A+B
0.94 - 1.06 for A-B

DUPLICATES:

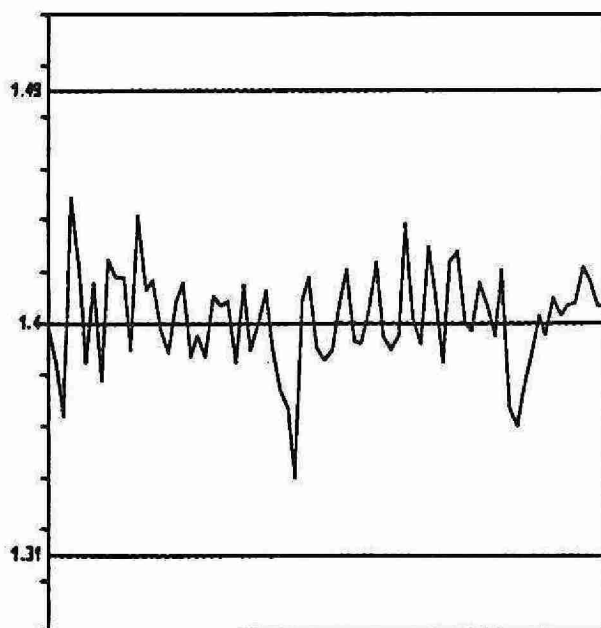
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
107	0.00	-	0.20	0.007	7.2
49	0.20	-	0.50	0.007	3.7
21	0.50	-	0.75	0.008	1.2
6	0.75	-	1.00	0.013	2.3
13	1.00	-	2.00	0.013	1.2
196	Overall			0.008	

OTHER CHECKS:

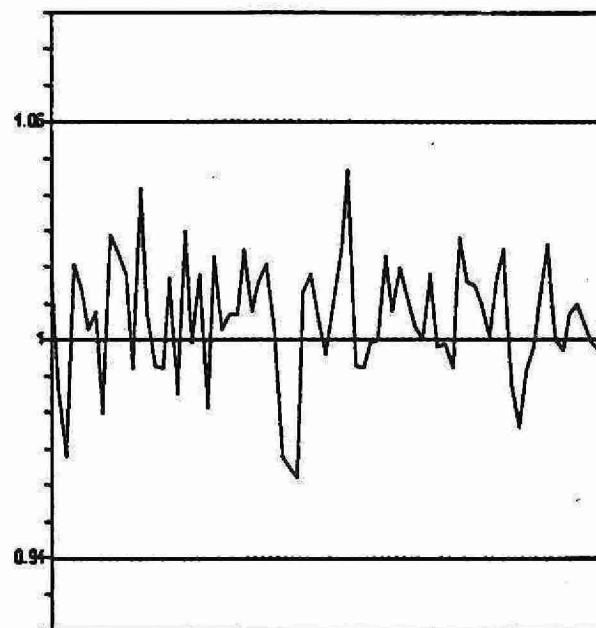
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	56	-0.0012	0.0073
Absorbance	51	0.1455	0.0155

CALCIUM - PRAA (MG/L AS Ca)

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

MODIFICATIONS:

20/11/89 - Analytical System switched to SpectrAA-400, an automated AAS with an IBM PC/2 Model 30 computer to provide instrument control, data processing and mainframe communications, with BL plus 5 standards

CALCIUM - PRAAS

QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89

Lab: Atomic Absorption

Analytical Range: - to 8.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	62	6.4	6.40	0.00	0.056
b :	62	1.6	1.61	0.01	0.031
a+b :	62	8.0	8.01	0.01	0.071
a-b :	62	4.8	4.80	0.00	0.056
c :	62	1.6	1.61	0.01	0.031
d :	62	0.4	0.41	0.01	0.026
c+d :	62	2.0	2.01	0.01	0.052
c-d :	62	1.2	1.20	0.00	0.025

s.d.(AB) Sw(within run): 0.039 S(between runs): 0.045 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.017 S(between runs): 0.028 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

7.64	-	8.36	for	A+B
4.65	-	4.95	for	A-B
1.64	-	2.36	for	C+D
1.05	-	1.35	for	C-D

DUPLICATES:

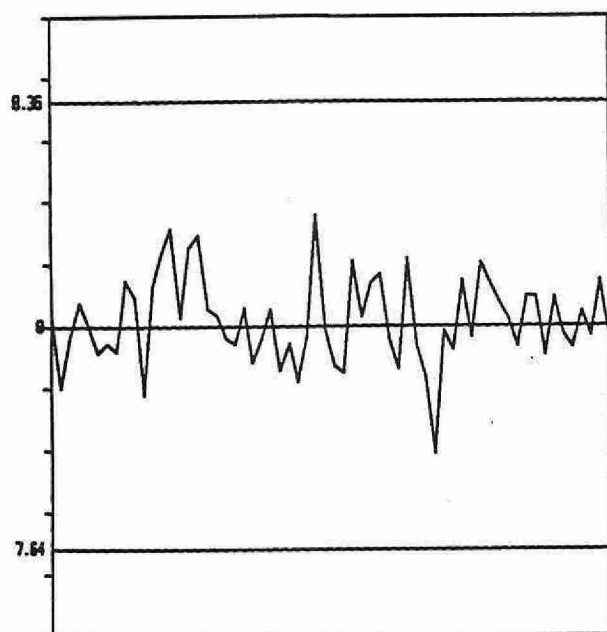
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
15	0.00 - 1.60	0.022	1.8
68	1.60 - 3.00	0.031	1.1
58	3.00 - 5.00	0.040	1.0
14	5.00 - 8.00	0.061	1.0
155	Overall	0.038	

OTHER CHECKS:

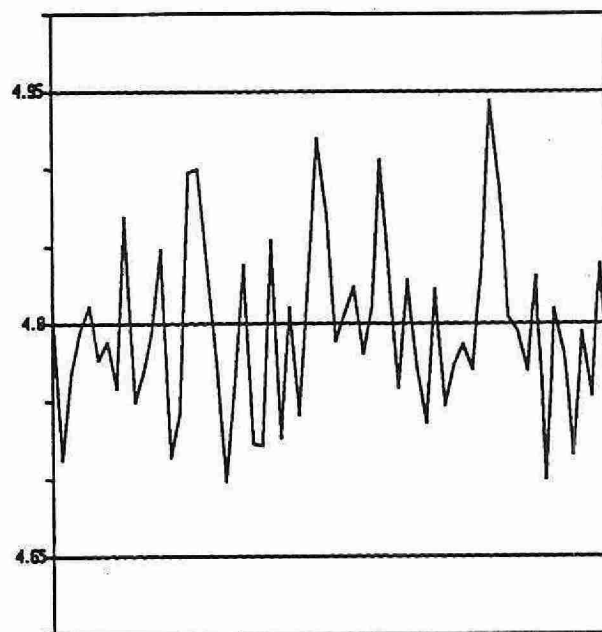
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	62	0.0001	0.0114
Absorbance	55	0.5057	0.0600

CALCIUM - PRAAS (MG/L AS Ca)

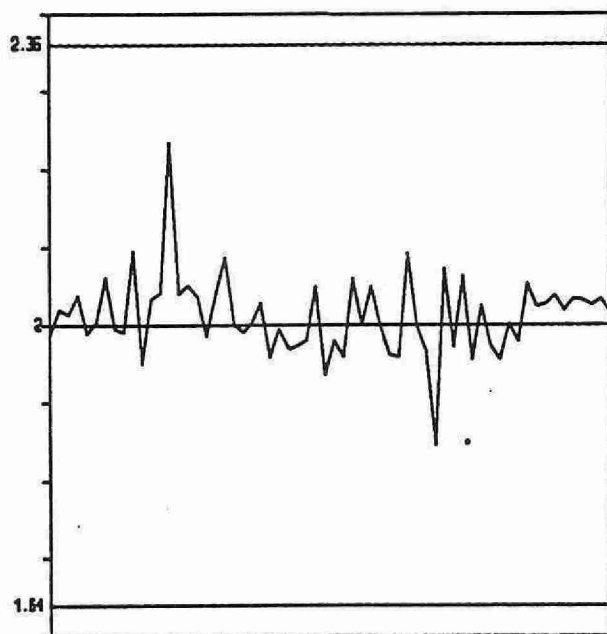
QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89



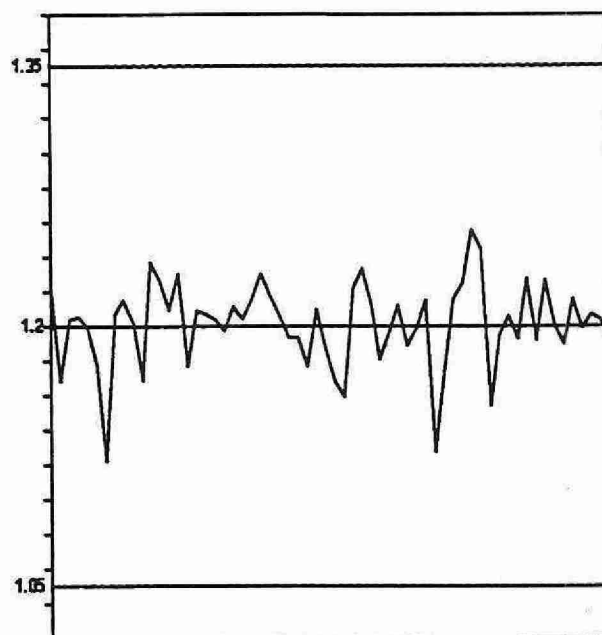
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: RMAAS	Unit Code	: 064820
Method Code	: 0901A1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required : 6 mL
Container : Pet 500 mL Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.14 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection AAS system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL every 10 samples; 2 standards every 20 samples.

CALCIUM - RMAAS

QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89

Lab: Atomic Absorption

Analytical Range: - to 40.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	87	32.0	31.65	-0.35	0.253
b :	87	8.0	7.97	-0.03	0.093
a+b :	87	40.0	39.62	-0.38	0.286
a-b :	87	24.0	23.67	-0.33	0.251
c :	87	8.0	7.97	-0.03	0.093
d :	87	2.0	1.99	-0.01	0.043
c+d :	87	10.0	9.96	-0.04	0.118
c-d :	87	6.0	5.98	-0.02	0.085

s.d.(AB) Sw(within run): 0.18 S(between runs): 0.19 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.06 S(between runs): 0.07 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.35	-	41.65	for	A+B
22.90	-	25.10	for	A-B
9.25	-	10.71	for	C+D
5.50	-	6.50	for	C-D

DUPLICATES:

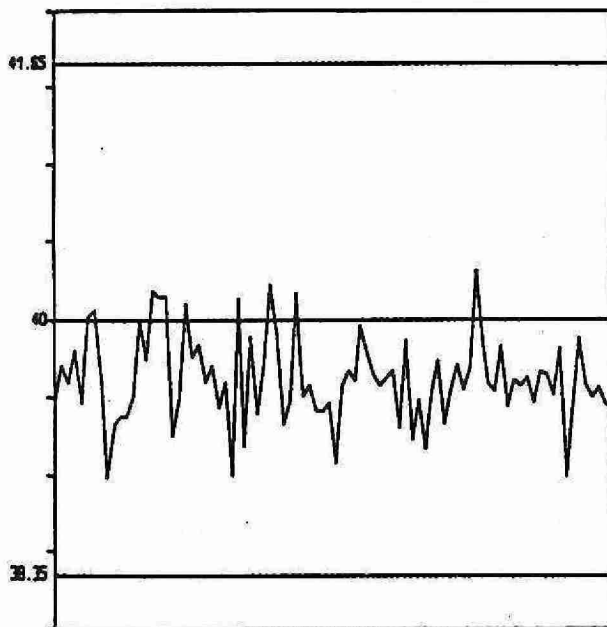
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
18	0.00 - 2.00	0.058	5.0
69	2.00 - 5.00	0.077	2.5
30	5.00 - 10.00	0.125	1.7
15	10.00 - 20.00	0.150	1.3
56	20.00 - 40.00	0.250	1.0
188	Overall	0.136	

OTHER CHECKS:

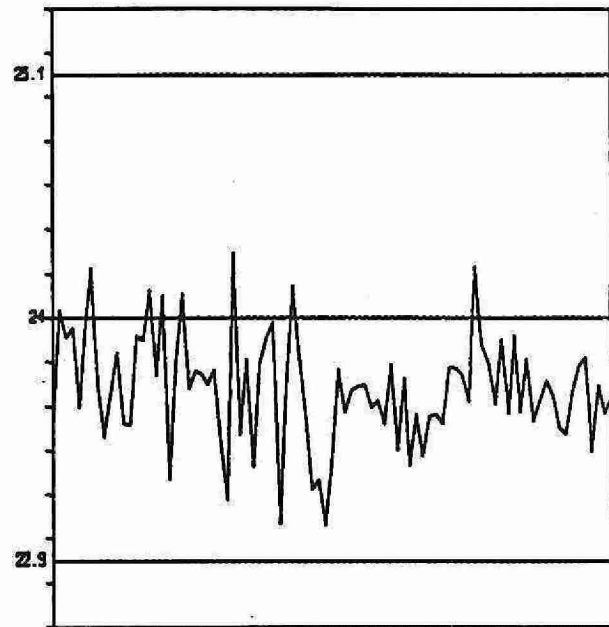
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	86	0.00	0.021
Absorbance	80	1.13	0.145

CALCIUM - RMAAS (MG/L AS Ca)

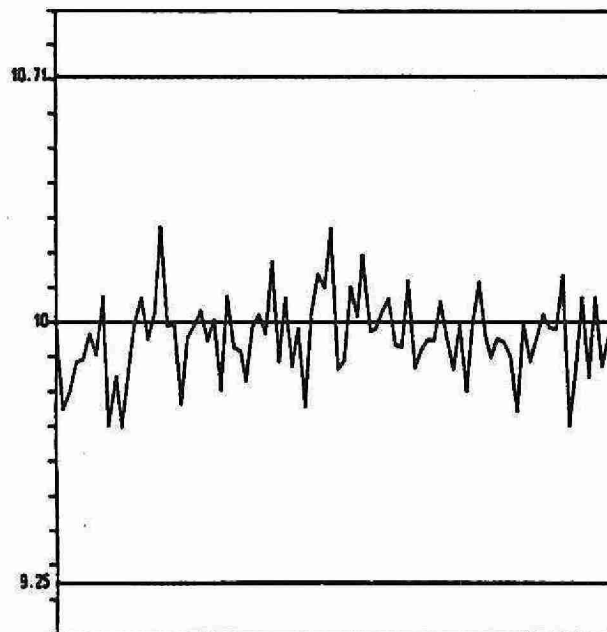
QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89



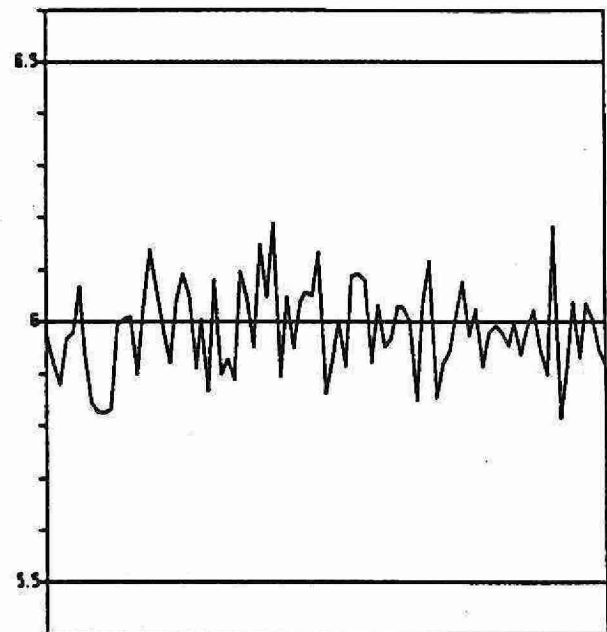
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: M. Young
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Pet 500 mL Jar

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.17 at the full scale level.

INSTRUMENTATION:

Automated flow injection AAS system

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/11/89 -Everex system 1800 microcomputer software system introduced

CALCIUM - WAAS

QUALITY CONTROL DATA FROM 05/01/89 TO 27/12/89

Lab: Atomic Absorption

Analytical Range: - to 200.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	152	160.0	159.4	-0.6	2.46
b :	152	40.0	39.8	-0.2	0.87
a+b :	152	200.0	199.2	-0.8	2.79
a-b :	152	120.0	119.6	-0.4	2.41
c :	152	40.0	39.8	-0.2	0.87
d :	152	10.0	10.0	0.0	0.39
c+d :	152	50.0	49.8	-0.2	1.03
c-d :	152	30.0	29.8	-0.2	0.86

s.d.(AB) Sw(within run): 1.71 S(between runs): 1.84 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.61 S(between runs): 0.67 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

189.9	-	210.0	for	A+B
113.3	-	126.7	for	A-B
44.5	-	54.5	for	C+D
27.0	-	33.0	for	C-D

DUPLICATES:

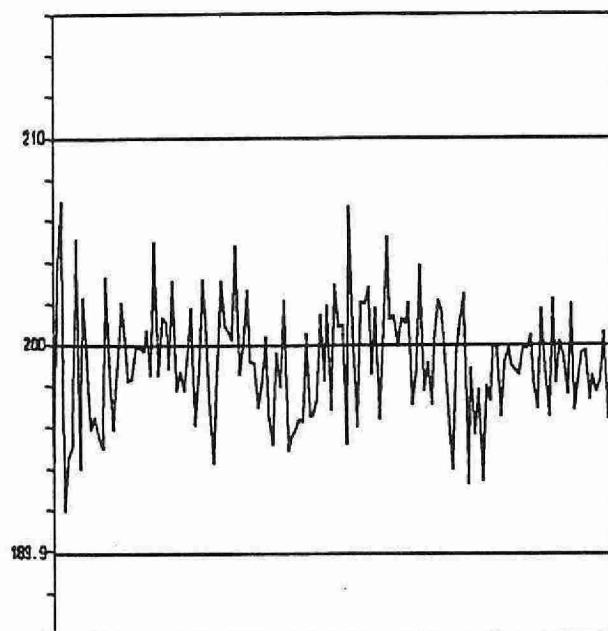
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
50	0.00 - 10.00	0.313	8.5
29	10.00 - 20.00	0.495	3.1
120	20.00 - 50.00	0.654	2.1
134	50.00 - 100.00	1.377	1.7
82	100.00 - 200.00	2.034	1.5
415	Overall	1.033	

OTHER CHECKS:

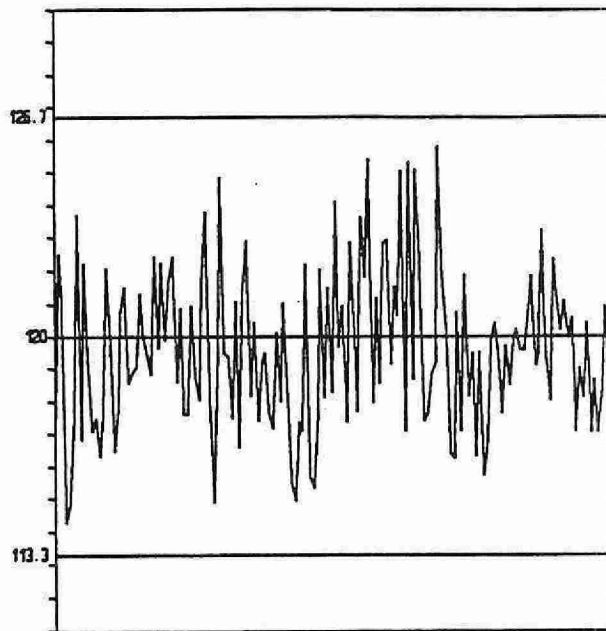
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	149	-0.017	0.2586
Absorbance	139	1.152	0.0507

CALCIUM - WAAS (MG/L AS Ca)

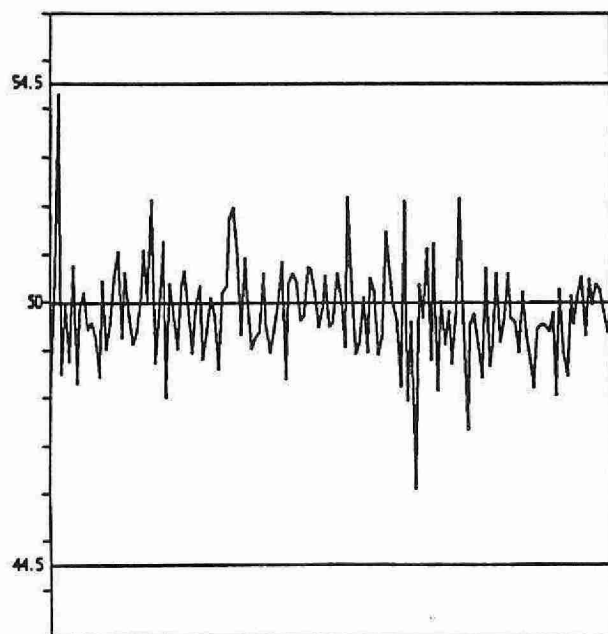
QUALITY CONTROL DATA FROM 05/01/89 TO 27/12/89



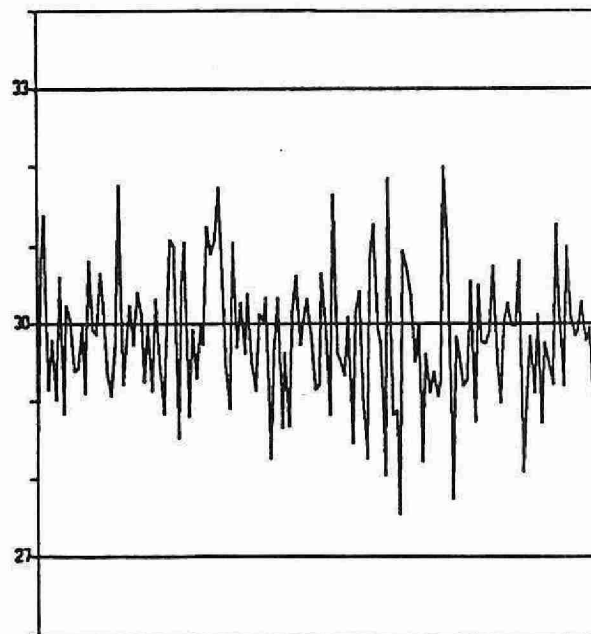
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** DISSOLVED INORGANIC - CARBON *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 03/06/80
LIS Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: DODIC	Unit Code	: 064806
Method Code	: 1127C2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required: 50 mL

Container: Pyrex culture tubes plus screw caps with cone-shape liners, completely filled with no air space.

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 9 standards daily

CONTROLS:

Calibration: LTB plus 4 standards, e.g. QCA, QCB, QCC, QCD

Drift: BL every 10 samples; BL plus 1 check standard every 20 samples

NOTES:

As concentrations of calibration control solutions slowly change with time at these low concentrations, calibration control ranges are based on long term measured averages rather than expected concentrations. This method was changed to incorporate DCI in Jan. 1989.

DISSOLVED INORGANIC CARBON - DODIC

QUALITY CONTROL DATA FROM 03/01/89 TO 22/12/89

Lab: Dorset

Analytical Range: - to 10.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	140	7.50	7.46	-0.04	0.099
b :	140	2.25	2.19	-0.06	0.060
a+b :	140	9.75	9.65	-0.10	0.141
a-b :	140	5.25	5.28	0.03	0.083
c :	140	1.50	1.47	-0.03	0.045
d :	140	0.50	0.49	-0.01	0.033
c+d :	140	2.00	1.96	-0.04	0.071
c-d :	140	1.00	0.98	-0.02	0.033

s.d.(AB) Sw(within run): 0.059 S(between runs): 0.082 S/Sw: 1.38

s.d.(CD) Sw(within run): 0.023 S(between runs): 0.039 S/Sw: 1.67

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.15	-	10.35	for	A+B
4.85	-	5.65	for	A-B
1.70	-	2.30	for	C+D
0.80	-	1.20	for	C-D

DUPLICATES:

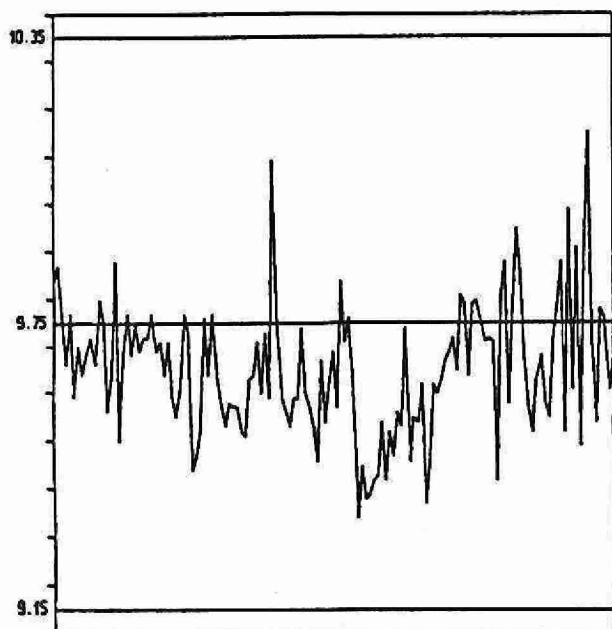
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
37	0.00	- 0.50	0.013	4.8
56	0.50	- 1.00	0.026	3.1
110	1.00	- 2.00	0.035	2.1
166	2.00	- 5.00	0.063	2.1
46	5.00	- 10.00	0.123	2.8
415	Overall		0.049	

OTHER CHECKS:

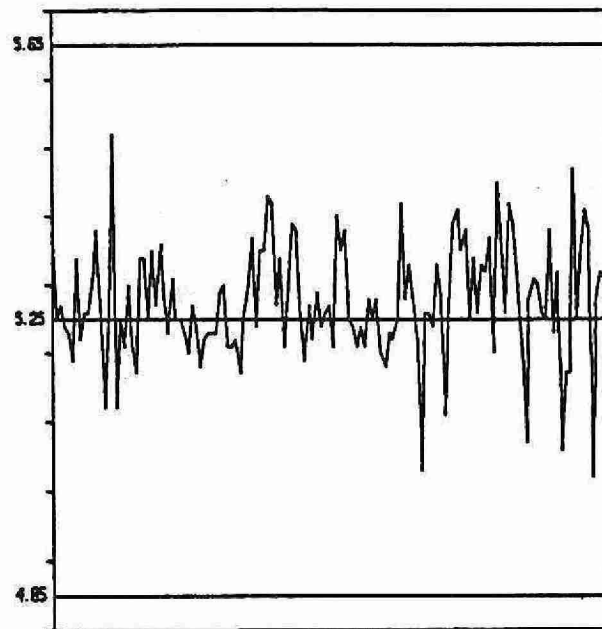
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	140	0.187	0.0398
Standard Calibration	140	400	0

DISSOLVED INORGANIC CARBON - DODIC (MG/L AS C)

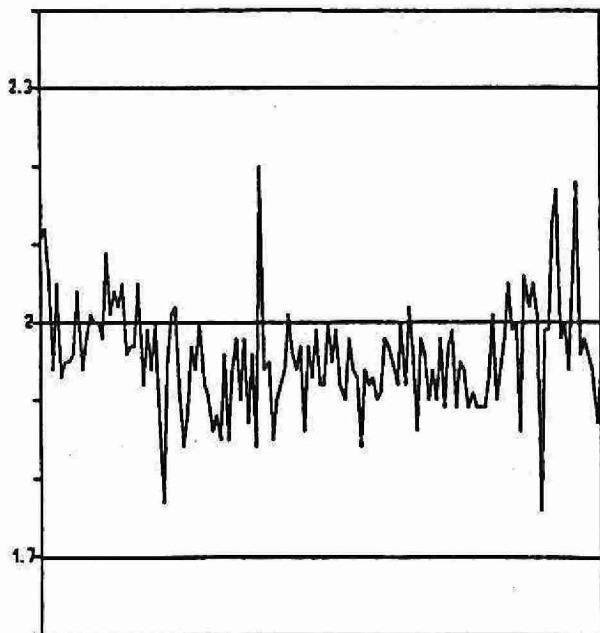
QUALITY CONTROL DATA FROM 03/01/89 TO 22/12/89



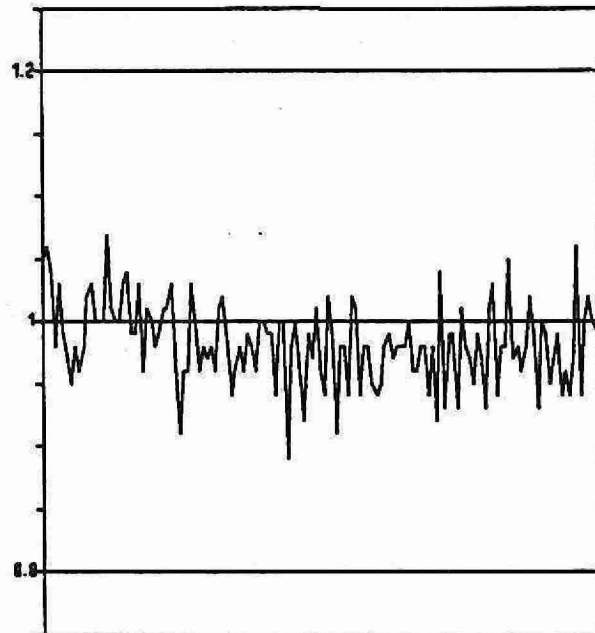
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** CARBON - DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
Lis Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

Dissolved organic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

DISSOLVED INORGANIC CARBON-ROM

QUALITY CONTROL DATA FROM 03/01/89 TO 29/12/89

Lab: Colourimetry

Analytical Range: - to 40.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	140	32	32.06	0.06	0.322
b :	140	8	7.86	-0.14	0.211
a+b :	140	40	39.92	-0.08	0.435
a-b :	140	24	24.20	0.20	0.328
c :	140	8	7.86	-0.14	0.211
d :	140	2	1.96	-0.04	0.116
c+d :	140	10	9.82	-0.18	0.292
c-d :	140	6	5.89	-0.11	0.177

s.d.(AB) Sw(within run): 0.23 S(between runs): 0.27 S/Sw: 1.17

s.d.(CD) Sw(within run): 0.12 S(between runs): 0.17 S/Sw: 1.36

On any given day the calibration is accepted if the values obtained lie within the ranges:

37.80	-	42.20	for	A+B
22.50	-	25.50	for	A-B
8.90	-	11.10	for	C+D
5.30	-	6.70	for	C-D

DUPLICATES:

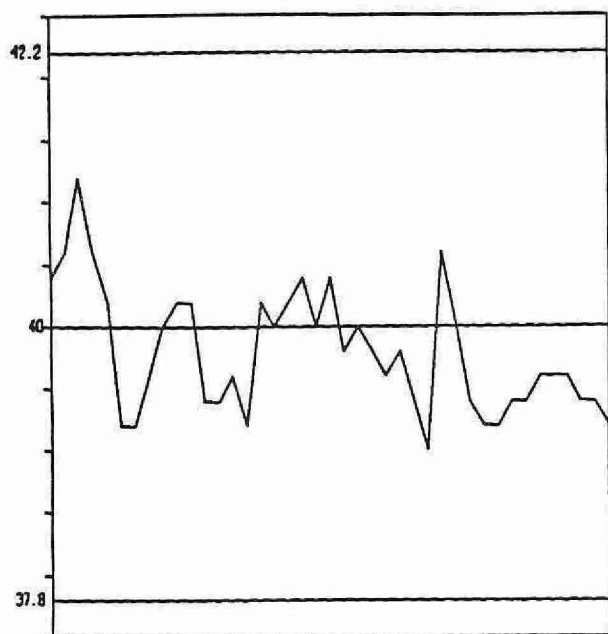
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
66	0.0	-	1.0	0.134	29.9
58	1.0	-	2.0	0.308	22.8
100	2.0	-	20.0	0.372	5.6
90	20.0	-	40.0	0.382	1.5
314	Overall			0.293	

OTHER CHECKS:

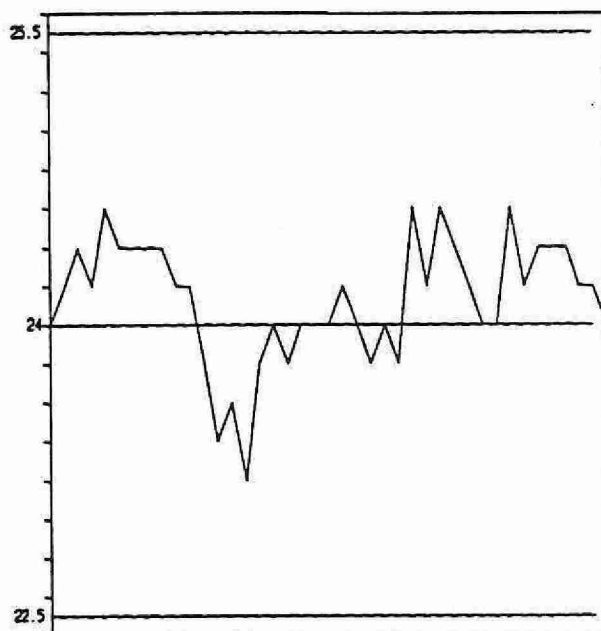
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	136	0.034	0.123

DISSOLVED INORGANIC CARBON - ROM (MG/L AS C)

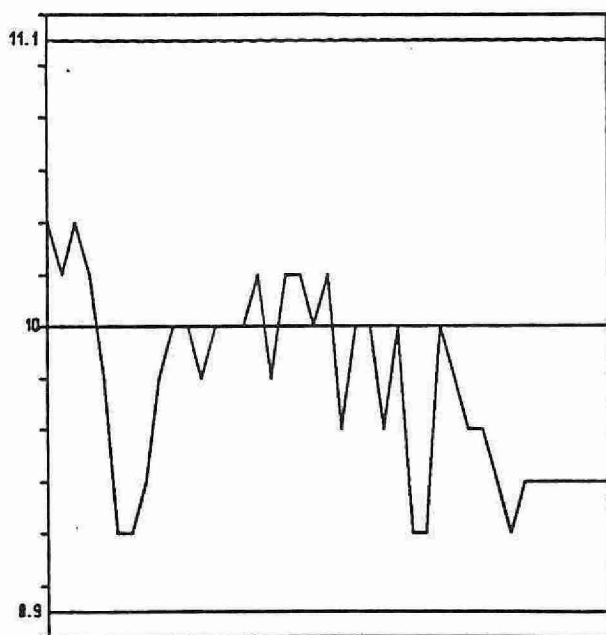
QUALITY CONTROL DATA FROM 03/01/89 TO 29/12/89



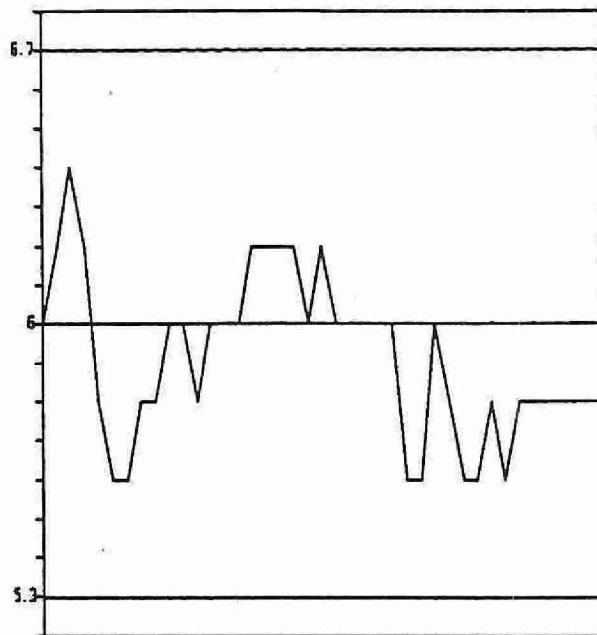
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** CARBON - DISSOLVED ORGANIC ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: DOC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas (500 mL/min) to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light (UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

Dissolved inorganic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO₂-free) supplies with flow controls, dialysis unit, UV digester. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

DISSOLVED ORGANIC CARBON-ROM

QUALITY CONTROL DATA FROM 03/01/89 TO 29/12/89

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	140	16.0	16.02	0.02	0.13
b :	140	4.0	3.97	- 0.03	0.09
a+b :	140	20.0	19.99	- 0.01	0.18
a-b :	140	12.0	12.05	0.05	0.13
c :	140	4.0	3.97	- 0.03	0.09
d :	140	1.0	1.02	0.02	0.07
c+d :	140	5.0	4.99	-0.01	0.15
c-d :	140	3.0	2.95	-0.05	0.07

s.d.(AB) Sw(within run): 0.09 S(between runs): 0.11 S/Sw: 1.2

s.d.(CD) Sw(within run): 0.05 S(between runs): 0.08 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.30	-	20.70	for	A+B
11.50	-	12.50	for	A-B
4.60	-	5.40	for	C+D
2.76	-	3.24	for	C-D

DUPLICATES:

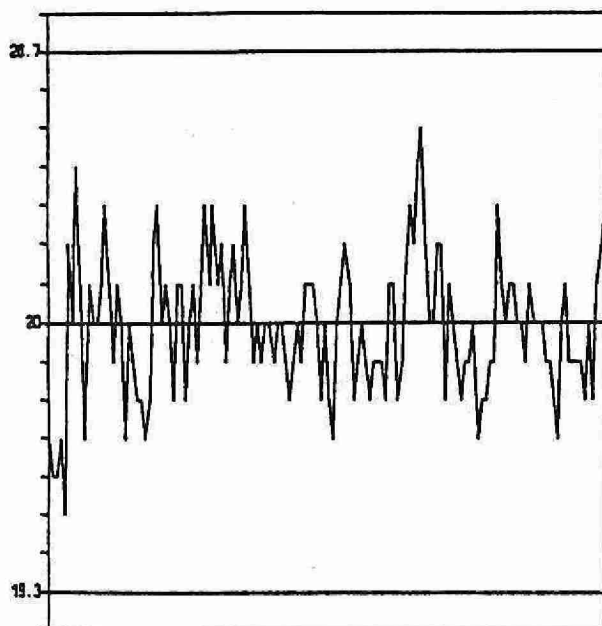
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
100	0.00	-	2.00	0.081	7.7
126	2.00	-	4.00	0.108	4.1
138	4.00	-	10.00	0.123	2.6
28	10.00	-	20.00	0.226	1.6
392	Overall			0.111	

OTHER CHECKS:

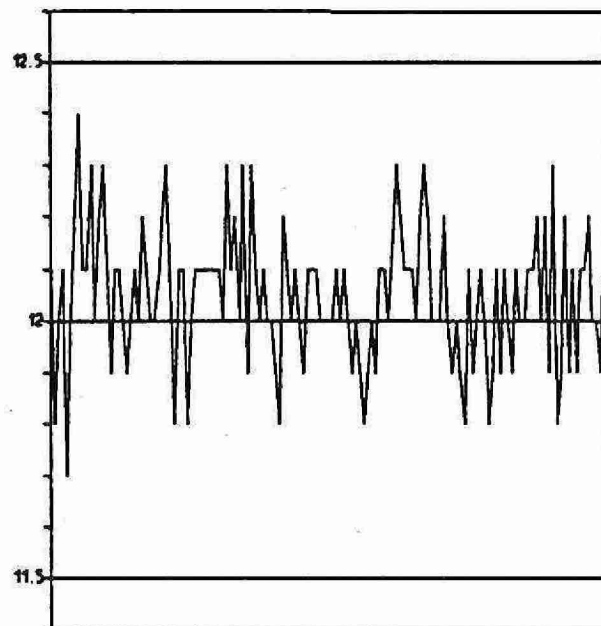
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	136	0.01	0.10

DISSOLVED ORGANIC CARBON - ROM (MG/L AS C)

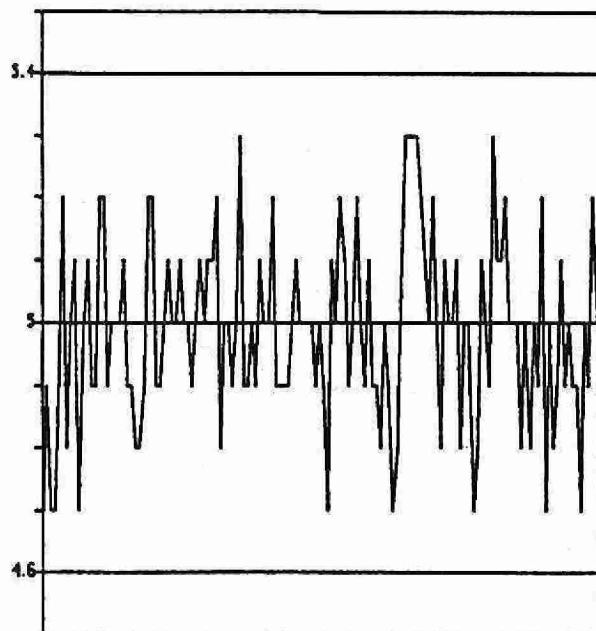
QUALITY CONTROL DATA FROM 03/01/89 TO 29/12/89



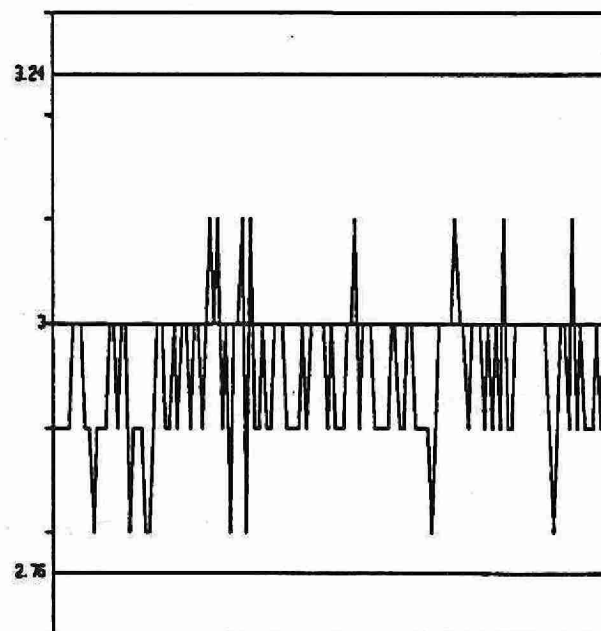
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** INORGANIC CARBON - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: TIC	Units	: % dry weight as C
Work Station Code	: DOTIC	Unit Code	: 070806
Method Code	: 002AB1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 2 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <500 um.

ANALYTICAL PROCEDURE:

Inorganic carbon is determined by measuring the CO₂ evolved by the reaction of carbonate with hydrochloric acid in a closed system (constant temperature and pressure). The CO₂ is swept by purified air through a KI scrubber into the cathode compartment of a coulometer in which the CO₂ is absorbed by the cathode solution. It is measured by automated coulometric titration to a colourimetric endpoint.

INSTRUMENTATION:

- Coulometrics 5010 CO₂ coulometer
- Carbonate impinger train - Coulometrics
- Balance, accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CONTROLS:

Calcium Carbonate 12%
Barium Carbonate (6.1%)
Two soil samples representing different soil types and inorganic carbon concentrations.

NOTES:

Inorganic carbon is not analyzed for samples in which pH (0.01M CaCl₂) < 5.0.

INORGANIC CARBON - DOTIC

QUALITY CONTROL DATA FROM 05/04/89 TO 27/09/89

Lab: Dorset Soils

Analytical Range: - to 2.0 % as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	12	12.00	11.976	-0.004	0.056
b :	12	6.08	6.073	-0.007	0.056
a+b :	12	18.08	18.048	-0.032	0.049
a-b :	12	5.92	5.903	-0.017	0.101

s.d.(AB) Sw(within run): 0.071 S(between runs): 0.056 S/Sw: 0.78

On any given day the calibration is accepted if the values obtained lie within the ranges:

16.58 - 19.58 for A+B
4.92 - 6.92 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	12	3.56	0.062
R2 :	12	0.016	0.0044

DUPLICATES:

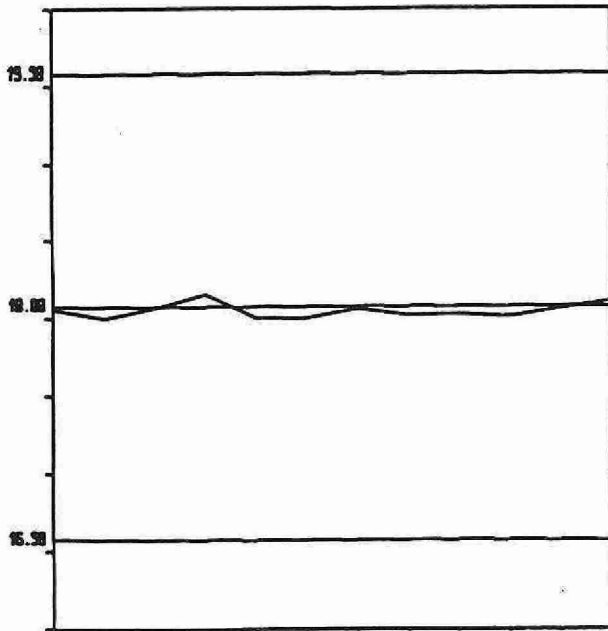
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
20	0.0 - 0.1	0.002	6.9
11	0.1 - 10.0	0.016	3.4
0	10.0	N.A.	N.A.
31	Overall	0.010	

OTHER CHECKS:

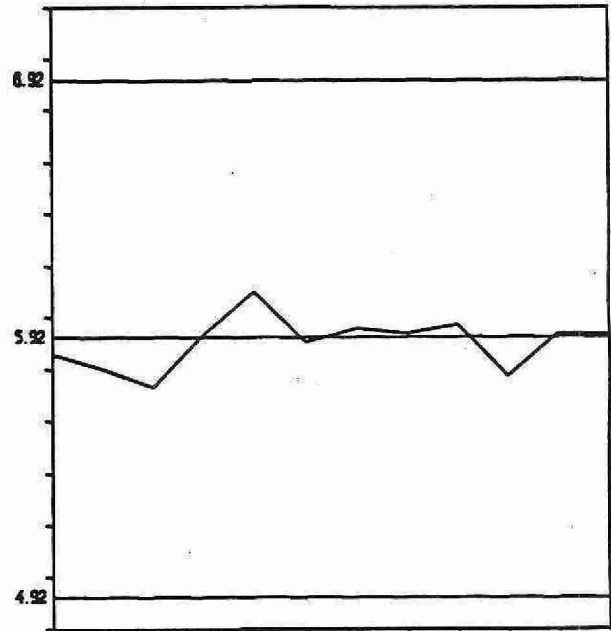
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	12	0.004	0.0015

INORGANIC CARBON - SOIL - DOTIC (% AS C)

QUALITY CONTROL DATA FROM 05/04/89 TO 27/09/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

***** TOTAL CARBON - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/10/80
LIS Test Name Code	: ORGC	Units	: % organic carbon
Work Station Code	: DOOXMAT	Unit Code	: 500806
Method Code	: CALCO1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.1 to 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and a <2mm subsample ground to <500um.

ANALYTICAL PROCEDURE:

Total carbon is determined by a UIC/Colourimetrics combustion furnace with electrometric titration. The percentage by weight of organic carbon in a soil sample is reported and is calculated as the difference between total carbon and inorganic carbon. Inorganic carbon (carbonate C) is determined colourimetrically after reaction of the sample in HCl.

INSTRUMENTATION:

-UIC/Colourimetrics combustion furnace with colourimetric titration of carbon

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CONTROLS:

CaCO₃, plus 2 representative soil samples, 3 duplicates

TOTAL CARBON - DOOXMAT

QUALITY CONTROL DATA FROM 11/05/89 TO 26/10/89

Lab: Dorset Soils

Analytical Range: - to 40.0 % total carbon

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	21	11.967	0.077
R2 :	21	3.702	0.069
R3 :	21	0.382	0.012

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
33	0.0	-	5.0	0.11	7.7
23	5.0	-	10.0	0.38	5.5
2	10.0	-	20.0	0.29	2.3
5	20.0	-	40.0	1.47	4.8
63	Overall			0.31	2.1

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Filtered Blank	19	0.017	0.005

*** TOTAL ORGANIC CARBON ***

IDENTIFICATION:

Laboratory	: MISA	Method Introduced	: 01/05/89
LIS Test Name Code	: TOC	Units	: mg/L as C
Work Station Code	: WAC	Unit Code	: 064000
Method Code	: SUM001	Supervisor	: P. Campbell
Sample Type/Matrix	: Industrial Effluents*, Sewage* (*Prior authorization required for this test)		

SAMPLING:

Quantity Required	: 500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

If particles in the sample are greater than about 2 mm diameter the sample is homogenized. An aliquot up to 100mL is acidified with sulphuric acid to pH 2.0, then bubbled with nitrogen gas for 10 minutes to remove inorganic carbon. The aliquot is then filtered through a 47 mm diameter glass fibre filter (particle size retention nominally 1.5 μ m). The filtrate is analyzed in an automated system, using ultra-violet/persulphate digestion with infra-red detection of carbon dioxide, to obtain the manually-acidified dissolved organic carbon (ADOC) result. The filter is dried at 103°C overnight and ignited at 1370°C in a Leco carbon analyzer to obtain the non-dissolved organic carbon (NDOC) result. The sum of ADOC and NDOC provides the TOC result.

INSTRUMENTATION:

Leco CR12 carbon analyzer
Astro 2001 carbon analyzer with autosampler

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

A solution of potassium biphthalate is used to calibrate the ADOC analyzer.
Powdered potassium biphthalate standards are used to calibrate the NDOC analyzer.

CONTROLS:

Calibration:	ADOC: 3 QC solutions NDOC: 2 powdered standards
Blanks:	ADOC: Untreated acidified distilled deionized water (LTB) and method blank NDOC: Unused filters and method blank filters are used
Drift:	Standard every 10 crucibles in Leco or every 10 tubes in auto-sampler
Matrix:	Repeat sample diluted 50% further at least every 10 samples Spiked sample at least every 10 samples
Precision:	Duplicate sample at least every 10 samples

MODIFICATIONS:

New Method

NOTES:

Extra QC checks were added for the MISA program.

TOTAL ORGANIC CARBON

QUALITY CONTROL DATA FROM 01/05/89 TO 31/12/89

Lab: MISA

Analytical Range: - to 50 mg/L as C

CALIBRATION CONTROL: ADOC, NDOC

<u>ADOC</u>	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
a :	53	40.0	40.29	0.290	0.7154
b :	53	5.0	5.38	0.380	0.4252
a+b :	53	45.0	45.68	0.680	0.9074
a-b :	53	35.0	34.91	-0.090	0.7495
c :	53	5.0	5.38	0.380	0.4252
d :	53	1.0	1.15	0.150	0.3353
c+d :	53	6.0	6.53	0.530	0.7078
c-d :	53	4.0	4.23	0.230	0.3058
<u>NDOC</u>	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
a :	32	32.0	32.57	0.570	0.9643
b :	32	12.0	12.28	0.280	0.6664
a+b :	32	44.0	44.86	0.860	1.3292
a-b :	32	20.0	20.29	0.290	0.9904

ADOC

s.d.(AB) Sw(within run): 0.53 S(between runs): 0.59 S/Sw: 1.11
s.d.(CD) Sw(within run): 0.22 S(between runs): 0.38 S/Sw: 1.77

NDOC

s.d.(AB) Sw(within run): 0.70 S(between runs): 0.83 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

ADOC

43.0 - 47.0 for A+B
33.0 - 37.0 for A-B
4.0 - 8.0 for C+D
3.0 - 5.0 for C-D

NDOC

40 - 48 for A+B
17 - 23 for A-B

TOTAL ORGANIC CARBON CONT'D

DUPLICATES:

TOC

Number of
Data Pairs

Sample
Concn Span

Mean(2)
s.d.

Coefficient
of var.(%)

19	0.0	-	10.0
22	10.0	-	100.0
4	100.0	-	400.0
45		Overall	

1.137
2.105
7.281
1.951

24.3
14.5
2.8

OTHER CHECKS:

Number
of Data

Data
Mean

Standard(1)
Deviation

ADOC: MTD BLK
ADOC: LTB
NDOC: MTD BLK

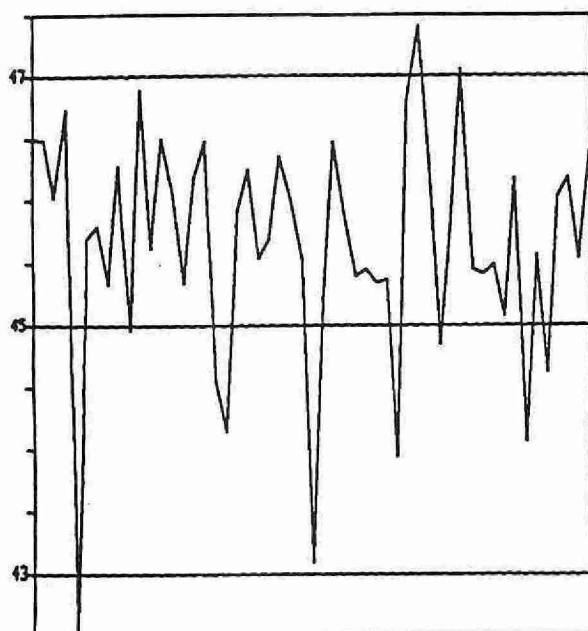
5
47
32

0.6200
0.1830
0.1130

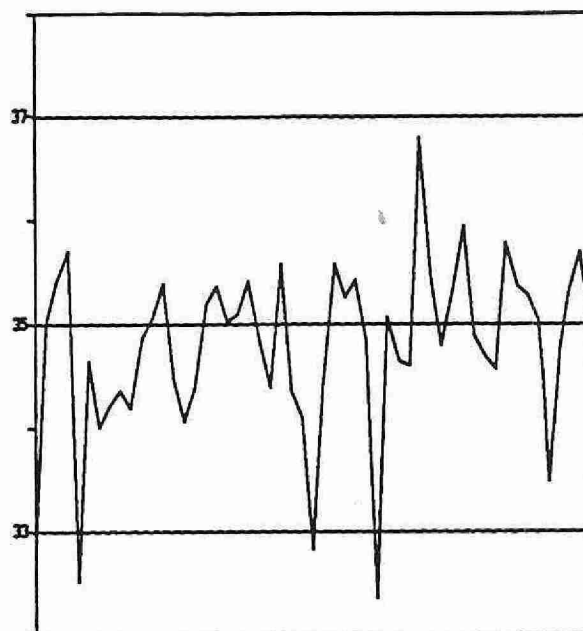
0.2560
0.2334
0.2120

TOTAL ORGANIC CARBON - WACTOC (MG/L AS C)

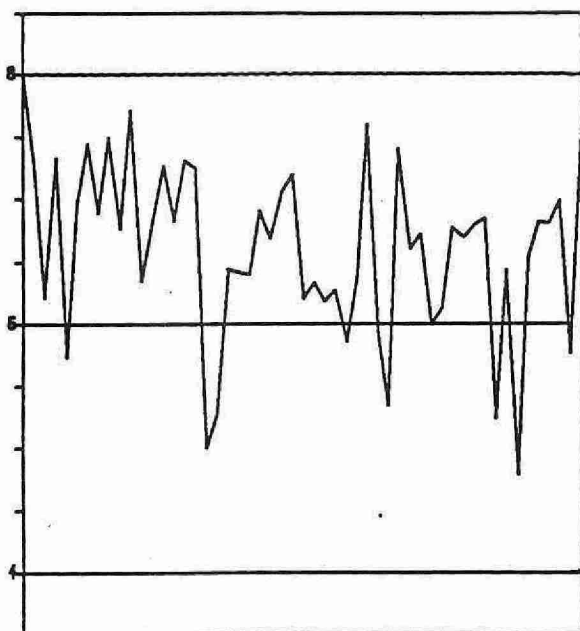
ADOC - QUALITY CONTROL DATA FROM 01/05/89 TO 31/12/89



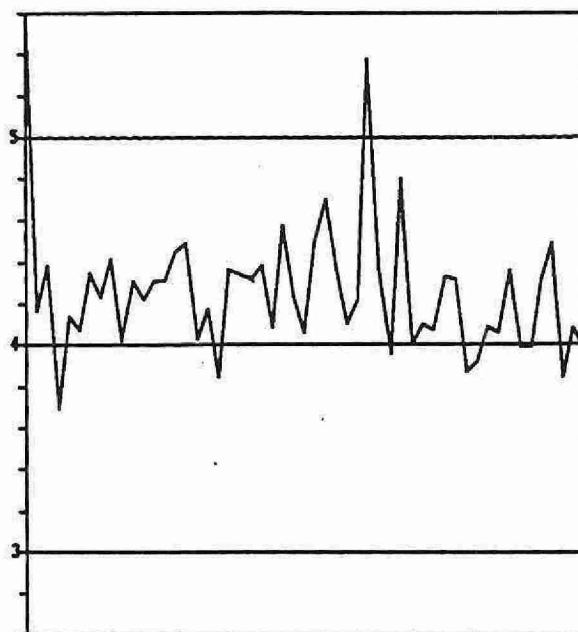
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D

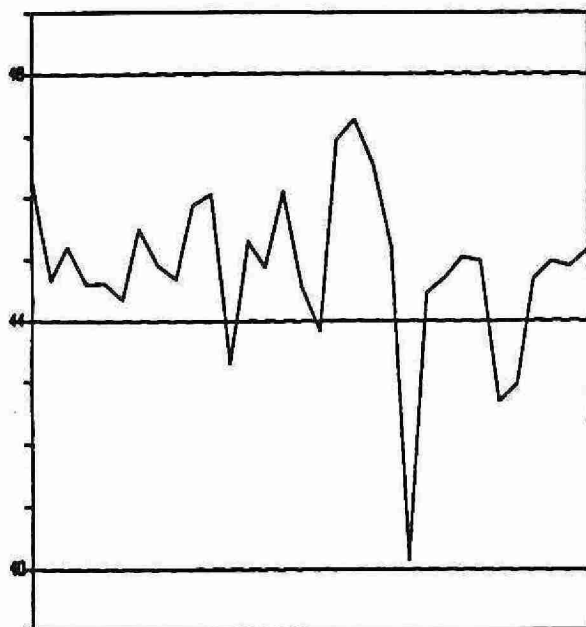


QUALITY CONTROL SAMPLE C-D

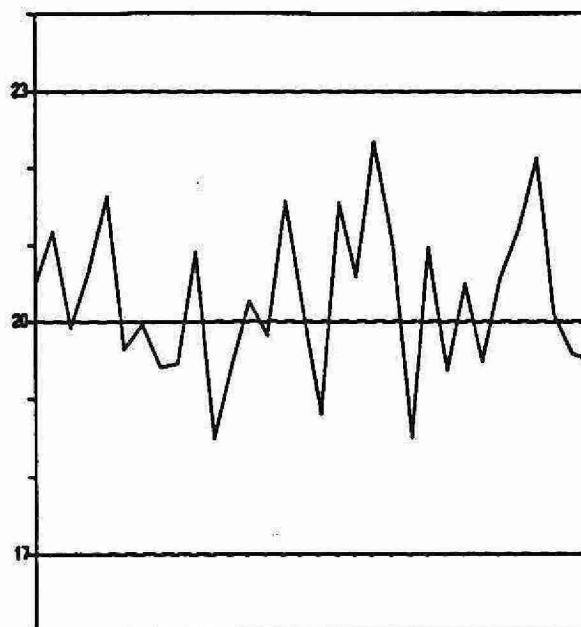
CONTROL LIMIT

TOTAL ORGANIC CARBON - WACTOC (MG/L AS C)

NDOC - QUALITY CONTROL DATA FROM 01/05/89 TO 31/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/75
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: COCL	Unit Code	: 064960
Method Code	: 004BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers (non-APIOS), Lakes (non-APIOS), Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 1.5 cm light path at 470nm.

Data capture, reduction, and processing via a multistage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA

Drift : BL every 10 samples; standard every 20 samples

NOTE:

This workstation was created Oct. 22/87 to take over all chloride testing being done on the ROM workstation, and at the separate "chloride only" sub-workstation. The original channels were retired at that time. The COCL workstation uses the identical method with a minor range change to suit the range of values expected from the full sample load. Chloride testing for river and lake samples collected under the APIOS program, and for precipitation samples, is performed by ion chromatography at the PRIC1 workstation.

CHLORIDE-COCL

QUALITY CONTROL DATA FROM 11/01/89 TO 22/12/89

Lab: Colourimetry

Analytical Range: - to 100 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	199	75.0	75.104	0.104	0.307
b :	199	25.0	25.103	0.103	0.166
a+b :	199	100.0	100.208	0.208	0.374
a-b :	199	50.0	50.002	0.002	0.323
c :	199	25.0	25.103	0.103	0.166
d :	199	5.0	5.001	0.001	0.138
c+d :	199	30.0	30.104	0.104	0.264
c-d :	199	20.0	20.102	0.102	0.153

s.d.(AB) Sw(within run): 0.23 S(between runs): 0.25 S/Sw: 1.08

s.d.(CD) Sw(within run): 0.11 S(between runs): 0.15 S/Sw: 1.41

On any given day the calibration is accepted if the values obtained lie within the ranges:

98.8	-	101.2	for	A+B
49.2	-	50.8	for	A-B
29.3	-	30.7	for	C+D
19.55	-	20.45	for	C-D

DUPLICATES:

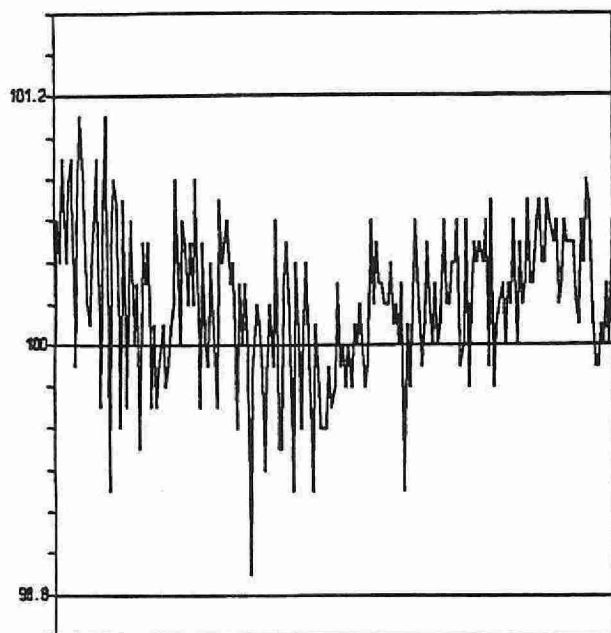
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
206	0.0	- 10.0	0.121	5.22
124	10.0	- 20.0	0.161	1.49
150	20.0	- 50.0	0.230	1.30
57	50.0	- 100.0	0.468	0.69
537	Overall		0.183	

OTHER CHECKS:

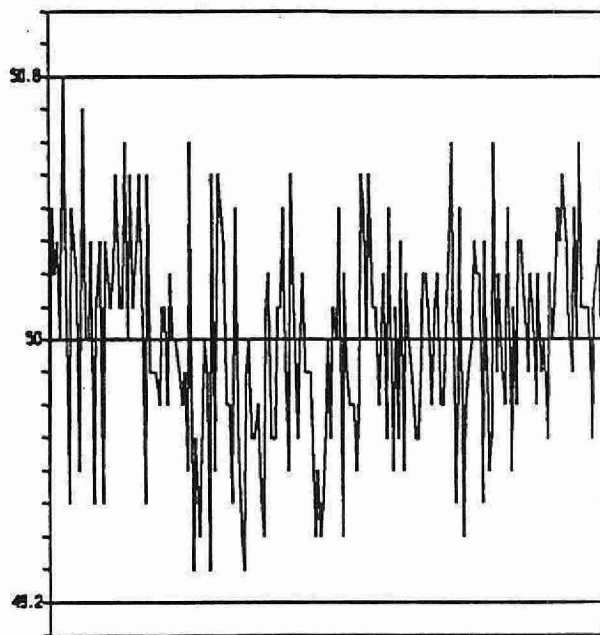
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	188	-0.031	0.158

CHLORIDE - COCL (MG/L AS CL)

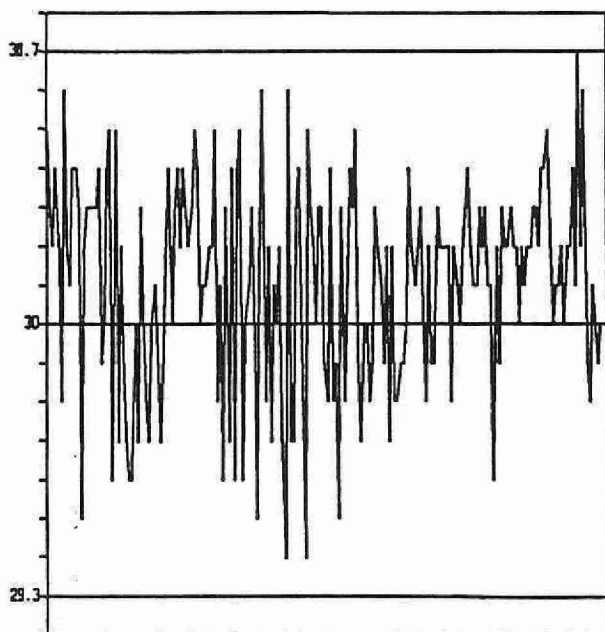
QUALITY CONTROL DATA FROM 11/01/89 TO 22/12/89



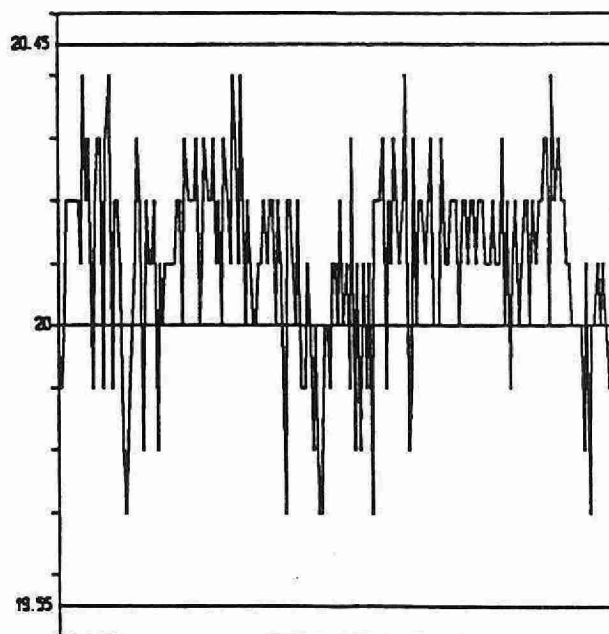
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: PRIC1	Unit Code	: 064960
Method Code	: 005A10	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene bottle

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards. Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

CHLORIDE - PRIC1

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89

Lab: Ion Chromatography

Analytical Range: - to 2.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	111	1.60	1.590	-0.010	0.025
b :	111	0.40	0.394	-0.006	0.020
a+b :	111	2.00	1.983	-0.017	0.036
a-b :	111	1.20	1.196	-0.004	0.028

s.d.(AB) Sw(within run): 0.020 S(between runs): 0.023 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.9 - 2.1 for A+B
1.1 - 1.3 for A-B

DUPLICATES:

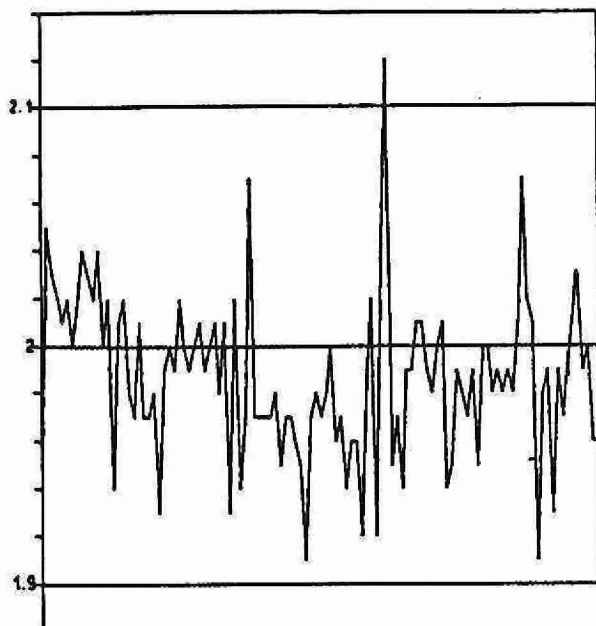
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
84	0.00 - 0.20	0.0115	12.0
112	0.20 - 0.50	0.0170	6.8
50	0.50 - 1.00	0.0174	3.0
25	1.00 - 2.00	0.0309	2.3
271	Overall	0.0161	

OTHER CHECKS:

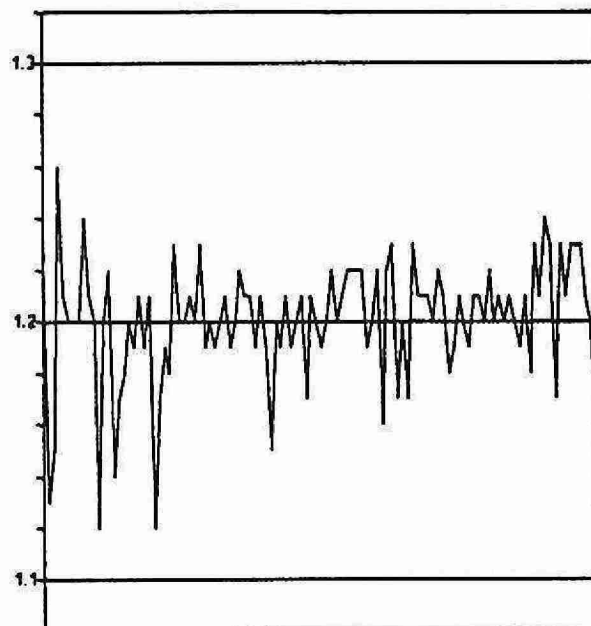
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	94	0.012	0.007

CHLORIDE - PRIC1 (MG/L AS CL)

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: ug/Filter as Cl
Work Station Code	: PRLOV	Unit Code	: 361960
Method Code	: 004AIC	Supervisor	: F. Lo
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as Cl. Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3

Current W value: 1

T value: 5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

CHLORIDE - PRLOV

QUALITY CONTROL DATA FROM 17/01/89 TO 21/12/89

Lab: Ion Chromatography

Analytical Range: - to 100 ug/filter as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	31	80.0	80.22	0.22	0.87
b :	31	20.0	20.21	0.21	0.85
a+b :	31	100.0	100.43	0.43	1.45
a-b :	31	60.0	60.02	0.02	0.94

s.d.(AB) Sw(within run): 0.67 S(between runs): 0.86 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.3 - 103.7 for A+B
57.5 - 62.5 for A-B

DUPLICATES:

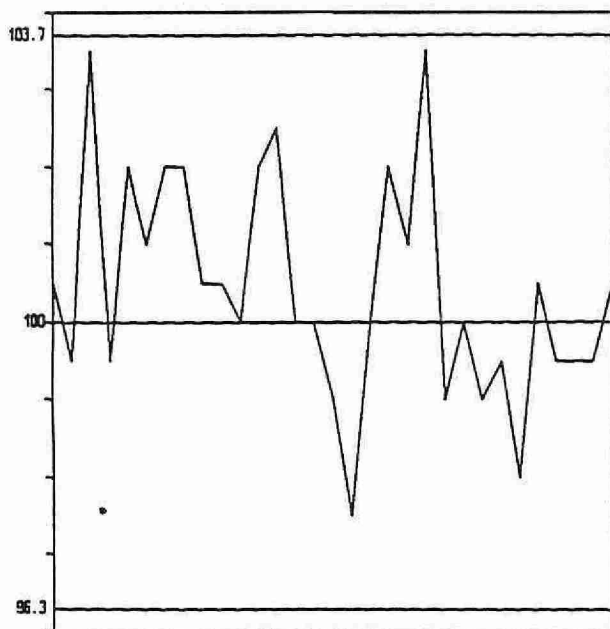
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
22	0.0	- 15.0	0.28	2.8
13	15.0	- 37.5	0.48	2.2
4	37.5	- 100.0	1.12	2.5
39	Overall		0.40	

OTHER CHECKS:

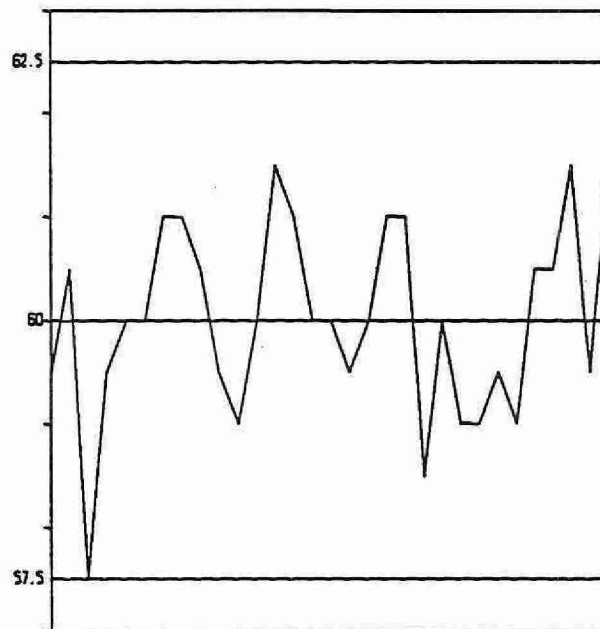
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	31	0.005	0.032

CHLORIDE - PRLOV (UG/FILTER AS CL)

QUALITY CONTROL DATA FROM 17/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** CHLOROPHYLL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/75
LIS Test Name Code	: CHLRAT,CHLRBT,CHLRAC	Units	: ug/L
Work Station Code	: RCHLO	Unit Code	: 06300
Method Code	: 002DS2	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required	: 1000 mL for clear samples; 500 mL if visibly green
Container	: Glass or plastic
Other	: In the field a sample is filtered through a nylon filter. The filter is folded and then placed between two membrane filter-support pads, and the package is enclosed in a plastic dish, kept in the dark or wrapped in aluminum foil, and shipped immediately, or kept frozen.

ANALYTICAL PROCEDURE:

Using a Commodore PET microcomputer-controlled, automated spectrophotometer, two scans are developed with absorbance measurements at 630, 645, and 663 nm for the first scans; the minimum absorbance value between 710 and 750 nm (readings at 5 nm intervals) is utilized as a turbidity correction. Chlorophyll a and b are calculated from this scan. After automated acidification, the second scan is obtained from the wavelengths 630, 645, 665 nm for calculating chlorophyll a, corrected. SCOR-UNESCO equations are used for all chlorophyll calculations.

INSTRUMENTATION:

- Automated modular continuous flow scanning spectrophotometer system
- Microcomputer system for control of sampling, timing and data processing (i.e. data capture, calculations and transfer of results to LIS)

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2,0.1,1*	T value :1,0.5,5*
--------------------------------	-----------------------------	-------------------

CONTROLS:

Calibration	: LTBL plus 2 "standards", e.g. QCA
Drift	: "standard", BL every 20 samples

NOTES:

"Standards" are prepared from chlorophyll a and b, but the materials are neither analytical grade nor are their solutions stable. Thus calibration controls are based on measured averages.

* Chlorophyll a, b and a acidified (corrected) respectively.

CHLRAC test method data summary not available due to insufficient data.

CHLOROPHYLL "a" - RCHLO

QUALITY CONTROL DATA FROM 01/01/89 TO 31/12/89

Lab: Colourimetry

Analytical Range: - to 500 ug/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	120	3.0	3.03	-0.03	0.119
b :	120	1.0	1.02	-0.02	0.076
a+b :	120	4.0	4.04	-0.04	0.180
a-b :	120	2.0	2.01	-0.01	0.086

s.d.(AB) Sw(within run): 0.06 S(between runs): 0.10 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.6 - 4.4 for A+B
1.8 - 2.2 for A-B

DUPLICATES:

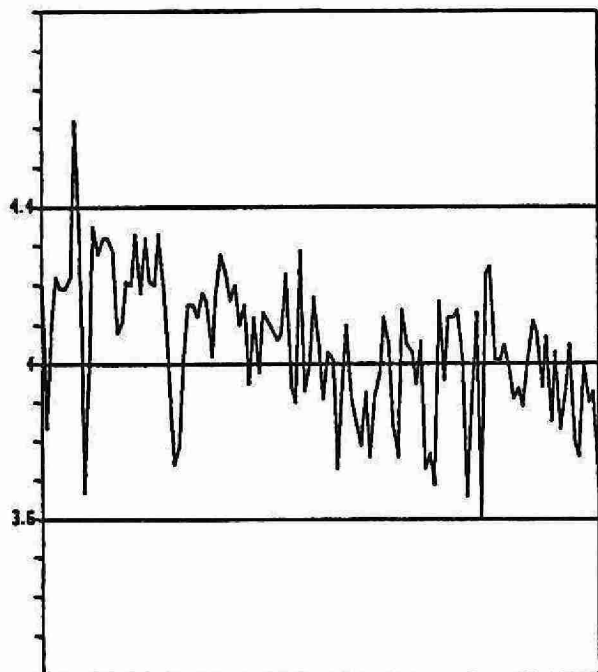
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
21	0.0	-	5.0	0.38	17.2
38	5.0	-	25.0	0.75	7.6
24	25.0	-	100.0	3.31	5.8
11	100.0	-	500.0	10.39	3.4
94	Overall			1.58	

OTHER CHECKS:

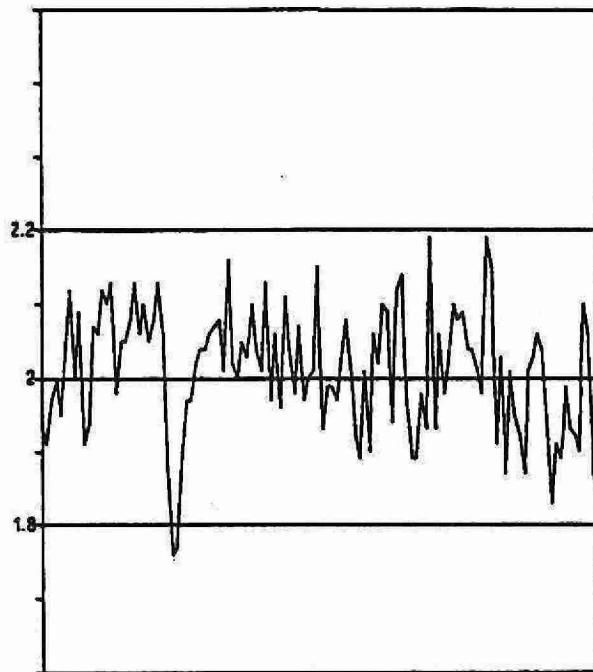
	Number of Data	Data Mean	Standard(1) Deviation
Blank	120	0.05	0.069

CHLOROPHYLL "a" RCHLO (UG/L)

QUALITY CONTROL DATA FROM 01/01/89 TO 31/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

CHLOROPHYLL "b" -RCHLO

QUALITY CONTROL DATA FROM 01/01/89 TO 31/12/89

Lab: Colourimetry

Analytical Range: - to 75.0 ug/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	120	3.0	2.9996	-0.0004	0.133
b :	120	1.0	1.0050	0.0050	0.083
a+b :	120	4.0	4.0046	0.0046	0.193
a-b :	120	2.0	1.9946	-0.0054	0.109

s.d.(AB) Sw(within run): 0.08 S(between runs): 0.11 S/Sw: 1.43

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.60 - 4.40 for A+B
1.80 - 2.20 for A-B

DUPLICATES:

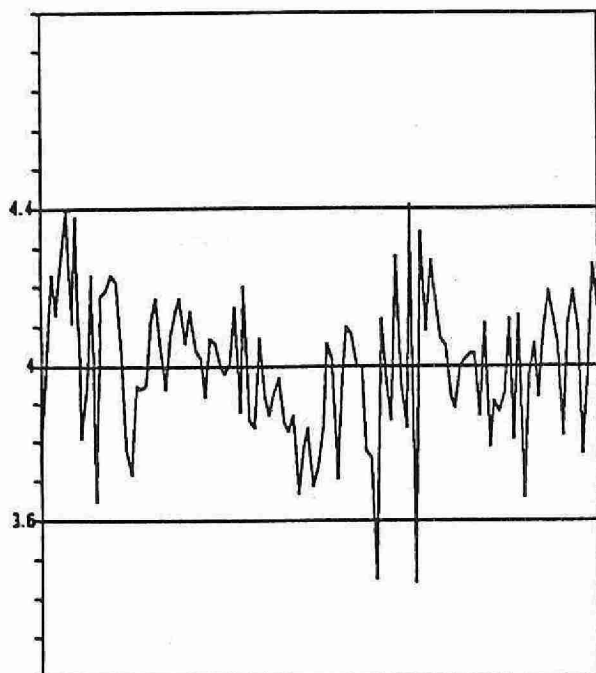
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
6	0.0	-	10.0	0.302	5.7
7	10.0	-	25.0	1.037	6.1
10	25.0	-	75.0	3.521	8.1
23	Overall			1.607	

OTHER CHECKS:

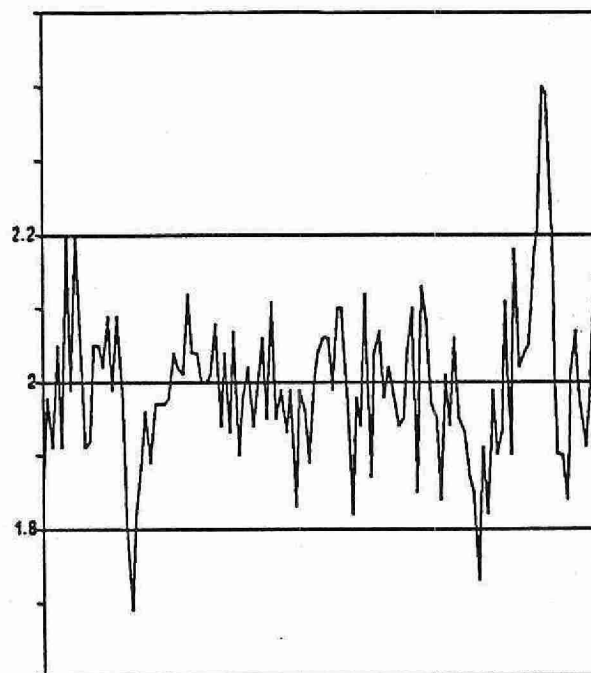
	Number of Data	Data Mean	Standard(1) Deviation
Blank	120	0.05	0.069

CHLOROPHYLL "b" RCHLO (UG/L)

QUALITY CONTROL DATA FROM 01/01/89 TO 31/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** CLAY ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CLAY	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to ≤ 2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 μm) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of clay in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (Handy)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery: 2 long term soil samples representing different soil types plus round robin ECSS samples (run occasionally)

CLAY - DOPARTSZ

QUALITY CONTROL DATA FROM 11/04/89 TO 04/10/89

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	8	52.75	3.95
R2 :	9	1.44	1.81

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.0 - 20.0	0.50	5.7
3	20.0 - 50.0	1.92	13.3
0	50.0 - 100.0	N.A	N.A
9	Overall		

***** COLOUR - TRUE *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 15/10/80
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: DOCC	Unit Code	: 340000
Method Code	: 1102KP	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes		

SAMPLING:

Quantity Required : 75 mL
Container : PET 500 mL Jar

ANALYTICAL PROCEDURE:

True colour is measured on a settle sample colourimetrically in a system calibrated with acidified chloroplatinate standards. Colour is measured using a broadband blue filter. Turbidity effects are partially suppressed by using a broadband red filter. True colour is calculated from the two absorbance measurements using an empirically derived equation.

Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

Two colourimeters, one with broadband blue filter (400-450 nm) and the other with broadband red filter (660-740 nm). Colourimetric measurement is through a 4.0 cm. light path.

REPORTING:

Maximum Significant Figures: 3

Current W value: 1.0

T value: 5

CALIBRATION:

Blank Only

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA, QCB

NOTES:

Slope factor is changed whenever light source in a colourimeter or cell is replaced. This is accomplished by analyzing 7 standards.

COLOUR - TRUE - DOCC

QUALITY CONTROL DATA FROM 03/01/89 TO 19/12/89

Lab: Dorset

Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	101	50.0	47.0	-3.0	1.7
b :	101	10.0	9.9	-0.1	0.9
a+b :	101	60.0	56.9	-3.1	2.3
a-b :	101	40.0	37.1	-2.9	1.4

s.d.(AB) Sw(within run): 1.02 S(between runs): 1.37 S/Sw: 1.34

On any given day the calibration is accepted if the values obtained lie within the ranges:

53 - 67 for A+B
35 - 45 for A-B

DUPLICATES:

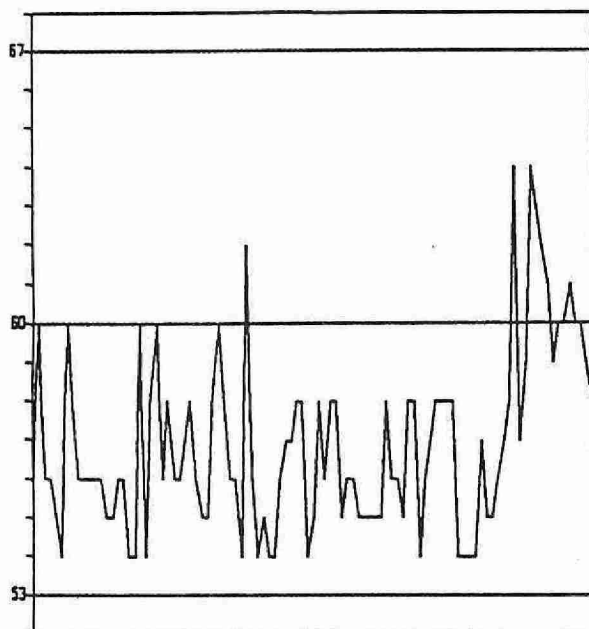
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
30	0.0	-	10.0	0.86	12.2
52	10.0	-	25.0	1.21	9.1
60	25.0	-	50.0	1.17	4.9
52	50.0	-	100.0	1.85	3.2
194	Overall			1.29	

OTHER CHECKS:

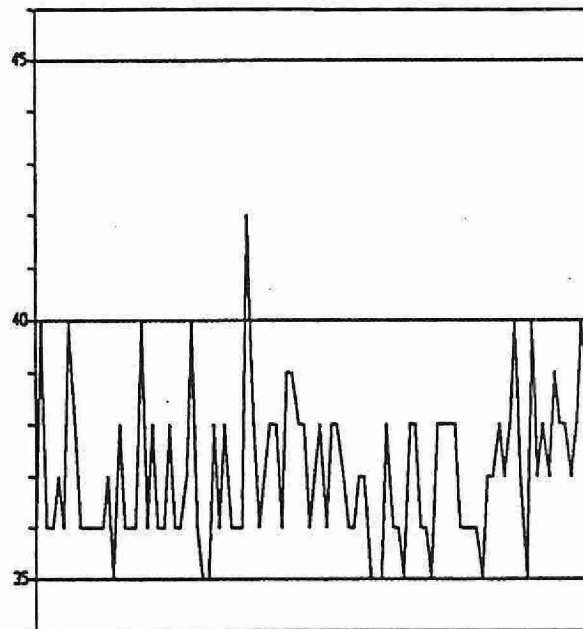
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	101	0	0

COLOUR TRUE - DOCC (TCU)

QUALITY CONTROL DATA FROM 03/01/89 TO 19/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** COLOUR - TRUE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 13/03/84
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: WCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Effluents, Surface Waters, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured colourimetrically on the supernatant of a settled sample in a system calibrated with acidified chloroplatinate standards. The sample stream is measured using a broadband blue filter. Residual turbidity effects are suppressed by using a broadband red filter and increased path length in the reference stream.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system. Colour measurement is through a 3.0 cm. light path using a broadband filter (400-450 nm). Turbidity measurement is through a 5.0 cm. light path using a different broadband filter (660-740 nm). Data capture, reduction, and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.5

T value: 2.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

COLOUR-TRUE-WCOL

QUALITY CONTROL DATA FROM 04/01/89 TO 27/12/89

Lab: Colourimetry

Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	68	70.0	70.31	0.31	0.635
b :	68	25.0	24.65	-0.35	0.396
a+b :	68	95.0	94.96	-0.04	0.790
a-b :	68	45.0	45.66	0.66	0.704
c :	68	25.0	24.65	-0.35	0.396
d :	68	7.5	7.43	-0.07	0.277
c+d :	68	32.5	32.07	-0.43	0.548
c-d :	68	17.5	17.22	-0.28	0.409

s.d.(AB) Sw(within run): 0.50 S(between runs): 0.53 S/Sw: 1.06

s.d.(CD) Sw(within run): 0.29 S(between runs): 0.34 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

91.60	-	98.40	for	A+B
42.75	-	47.25	for	A-B
29.60	-	35.40	for	C+D
15.55	-	19.45	for	C-D

DUPLICATES:

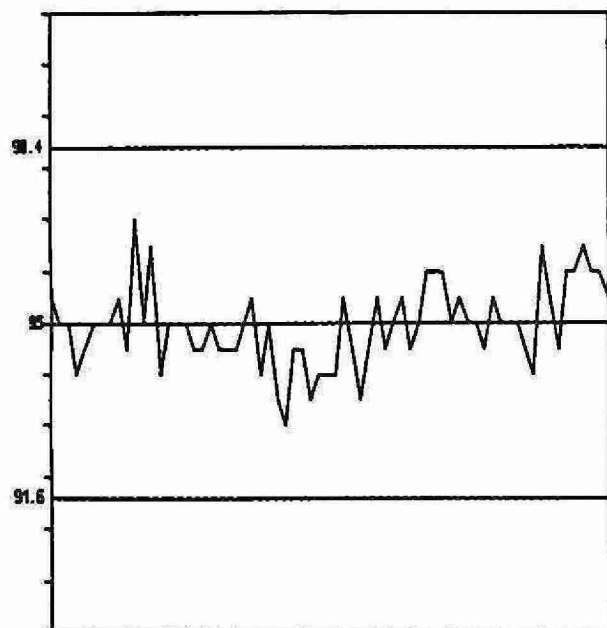
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
104	0.00	-	5.00	0.336	17.88
31	5.00	-	10.00	0.403	6.24
40	10.00	-	25.00	0.426	4.14
17	25.00	-	50.00	0.587	1.73
5	50.00	-	100.00	0.671	0.94
197	Overall			0.363	

OTHER CHECKS:

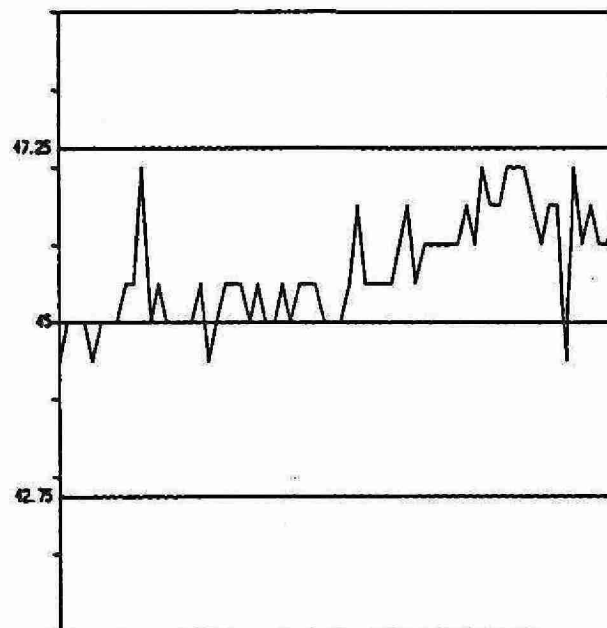
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	68	0.176	0.270

COLOUR TRUE - WCOL (TCU)

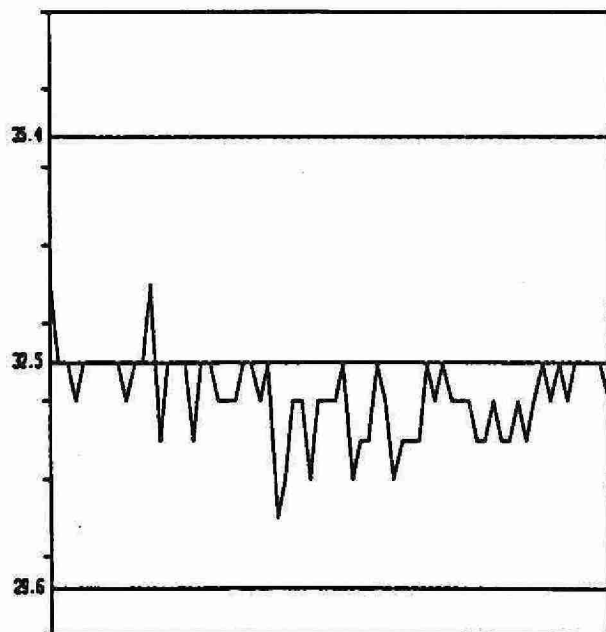
QUALITY CONTROL DATA FROM 04/01/89 TO 27/12/89



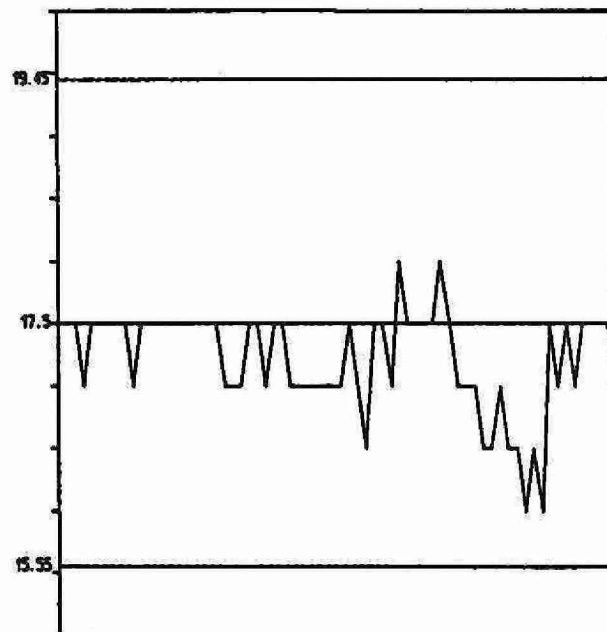
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: DOCC	Unit Code	: 350351
Method Code	: 0903CM	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation, Soil Leachates		

SAMPLING:

Quantity Required : 75 mL
Container : PET Jars

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell and equilibrated to 25°C. The conductivity is read directly from a digital display.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

None

CONTROLS:

Calibration : LTB plus 4 standards, e.g. QCA, QCB, 147 uS/cm plus 717.7 uS/cm stds.

NOTES:

*T value is based on duplicate analyses at concentrations above the lowest range.

CONDUCTIVITY - DOCC

QUALITY CONTROL DATA FROM 13/01/89 TO 01/12/89

Lab: Dorset

Analytical Range: - to 300 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	104	290.0	293.1	3.1	3.78
b :	104	74.0	75.5	1.5	0.89
a+b :	104	364.0	368.6	4.6	4.45
a-b :	104	216.0	217.6	1.6	3.22

s.d.(AB) Sw(within run): 2.27 S(between runs): 2.74 S/Sw: 1.21

On any given day the calibration is accepted if the values obtained lie within the ranges:

355 - 373 for A+B
210 - 222 for A-B

DUPLICATES:

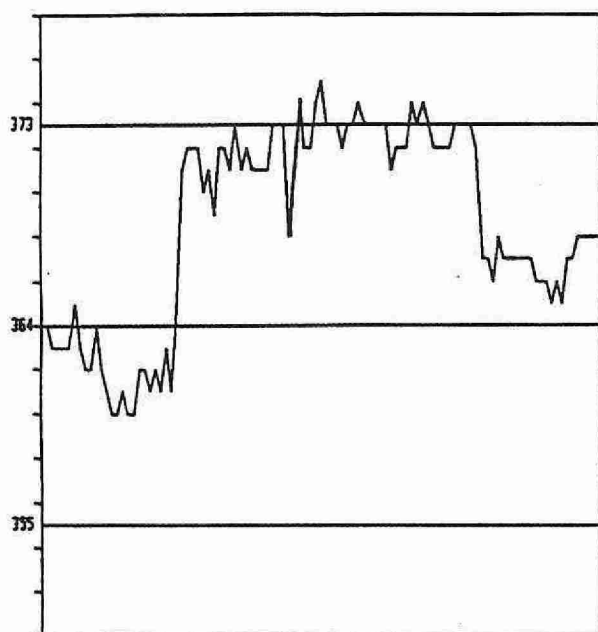
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.0 - 10.0	0.13	2.8
36	10.0 - 25.0	0.21	1.5
189	25.0 - 100.0	0.35	1.0
14	100.0 - 300.0	0.68	0.5
244	Overall	0.33	

OTHER CHECKS:

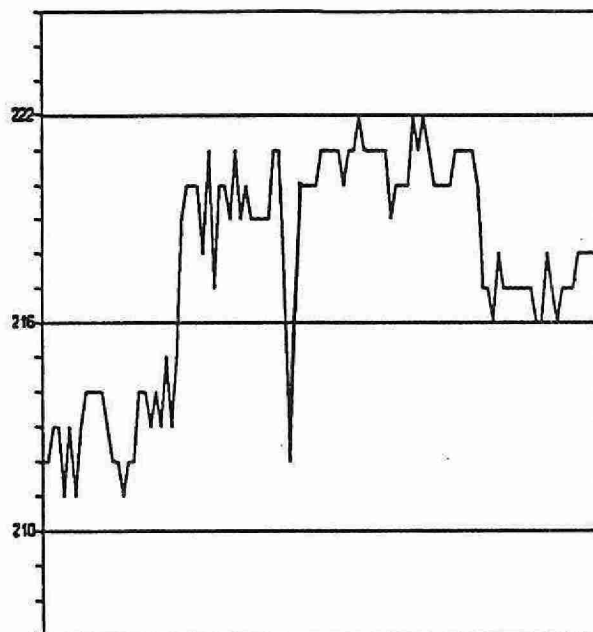
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	104	1.1	0.362

CONDUCTIVITY - DOCC (uS/CM)

QUALITY CONTROL DATA FROM 13/01/89 TO 01/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: PRCON	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Pet 500 mL jar

ANALYTICAL PROCEDURE:

After equilibration at 25°C, The conductivity of the sample is measured.

INSTRUMENTATION:

Automated modular continuous flow conductivity system comprised of sampler, water bath, conductivity meter with cell, chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

Compatibility between conductivity meter and chart recorder is confirmed by checking 3 standard resistances.

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 solution every 10 samples

NOTES:

A calibration standard for the ion chromatographic system is used to monitor the drift for the conductivity system, but its theoretical conductivity is unknown.

CONDUCTIVITY - PRCON

QUALITY CONTROL DATA FROM 03/02/89 TO 18/12/89

Lab: Ion Chromatography

Analytical Range: - to 100.0 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	58	44.5	42.4	-2.1	2.39
b :	58	7.5	7.2	-0.3	0.73
a+b :	58	52.0	49.6	-2.4	2.81
a-b :	58	37.0	35.3	-2.3	2.14

s.d.(AB) Sw(within run): 1.51 S(between runs): 1.77 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

43.0 - 61.0 for A+B
31.0 - 43.0 for A-B

DUPLICATES:

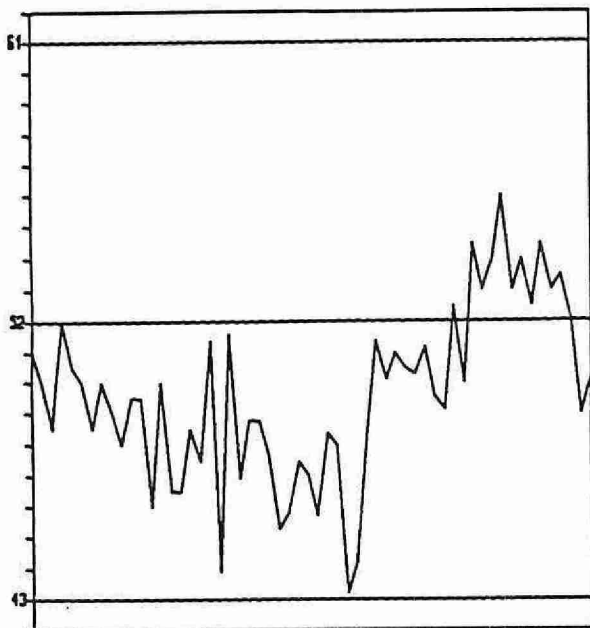
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
11	0.0	-	5.0	0.36	16.8
44	5.0	-	15.0	0.50	4.0
46	15.0	-	25.0	0.89	5.6
39	25.0	-	50.0	1.89	5.9
17	50.0	-	100.0	2.90	2.9
157	Overall			1.11	

OTHER CHECKS:

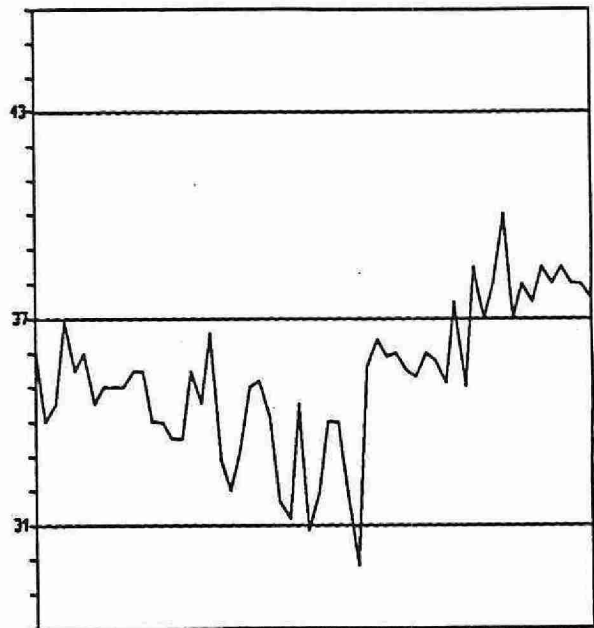
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	58	0.202	0.182

CONDUCTIVITY - PRCON (uS/CM)

QUALITY CONTROL DATA FROM 03/02/89 TO 18/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: RATS	Unit Code	: 350351
Method Code	: 002B12	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured.
pH, Gran alkalinity and total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: BL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

CONDUCTIVITY - RATS

QUALITY CONTROL DATA FROM 10/01/89 TO 20/12/89

Lab: Titration

Analytical Range: - to 1000 us/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	89	717.8	716.99	-0.81	1.65
b :	89	147.0	148.52	1.52	0.62
a+b :	89	864.8	865.51	0.71	1.89
a-b :	89	570.8	568.47	-2.33	1.64
c :	89	147.0	148.52	1.52	0.62
d :	89	37.1	38.36	1.26	0.41
c+d :	89	184.1	186.87	2.77	0.78
c-d :	89	109.9	110.16	0.26	0.71

s.d.(AB) Sw(within run): 1.16 S(between runs): 1.25 S/Sw: 1.08

s.d.(CD) Sw(within run): 0.50 S(between runs): 0.53 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

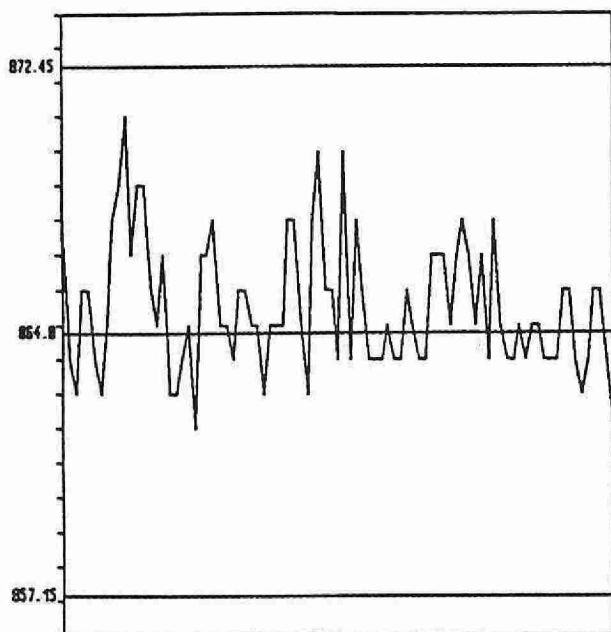
857.15	-	872.45	for	A+B
565.7	-	575.9	for	A-B
180.1	-	188.1	for	C+D
107.23	-	112.57	for	C-D

DUPLICATES:

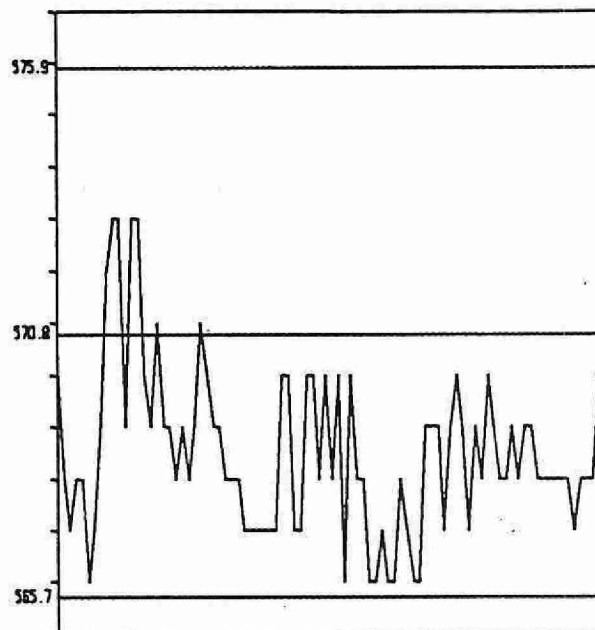
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
29	0	-	50	1.002	3.1
30	50	-	200	1.300	1.4
98	200	-	500	1.638	0.5
72	500	-	1000	2.007	0.3
8	1000	-	2000	6.319	0.5
237	Overall			1.673	

CONDUCTIVITY - RATS (uS/CM)

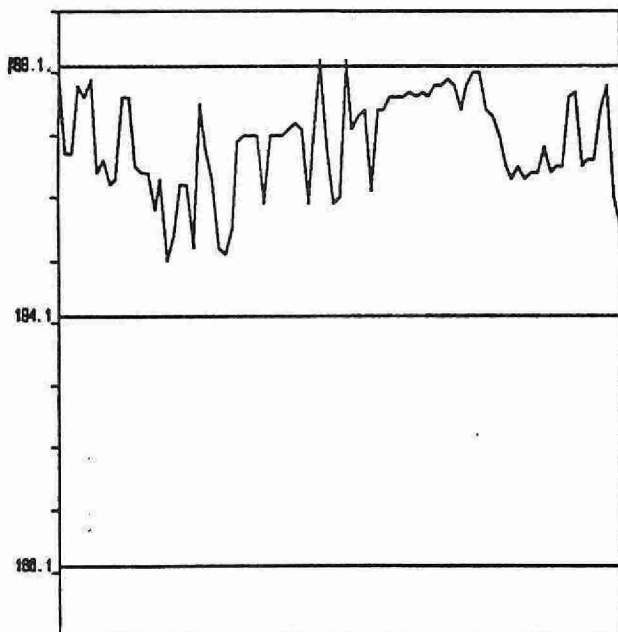
QUALITY CONTROL DATA FROM 10/01/89 TO 20/12/89



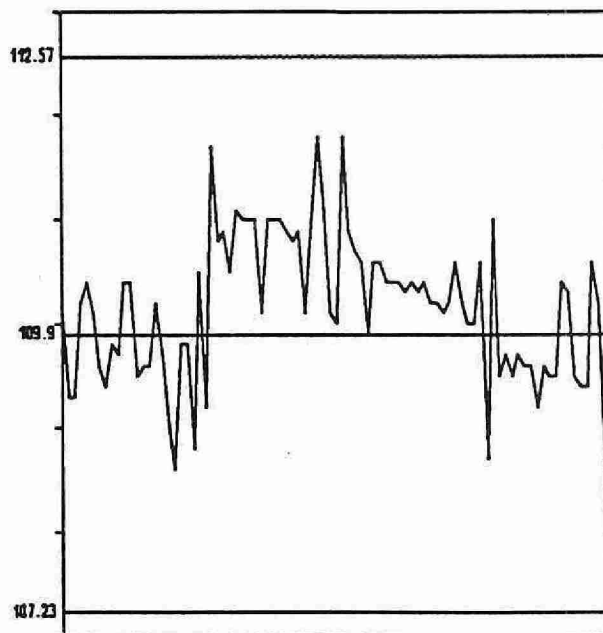
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Sample Type/Matrix	: Domestic Waters, Sewage, Industrial effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured.
pH and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

CONDUCTIVITY - WATS

QUALITY CONTROL DATA FROM 23/01/89 TO 21/12/89

Lab: Titration

Analytical Range: - to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	101	1413.0	1407.5	-5.5	7.54
b :	101	717.8	716.5	-1.3	3.53
a+b :	101	2130.8	2124.0	-6.8	10.74
a-b :	101	695.2	691.0	-4.2	4.82
c :	101	717.8	716.5	-1.3	3.53
d :	101	147.0	148.6	1.6	0.92
c+d :	101	864.8	865.0	0.2	4.30
c-d :	101	570.8	567.9	-2.9	2.85

s.d.(AB) Sw(within run): 3.41 S(between runs): 5.88 S/Sw: 1.7

s.d.(CD) Sw(within run): 2.02 S(between runs): 2.59 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

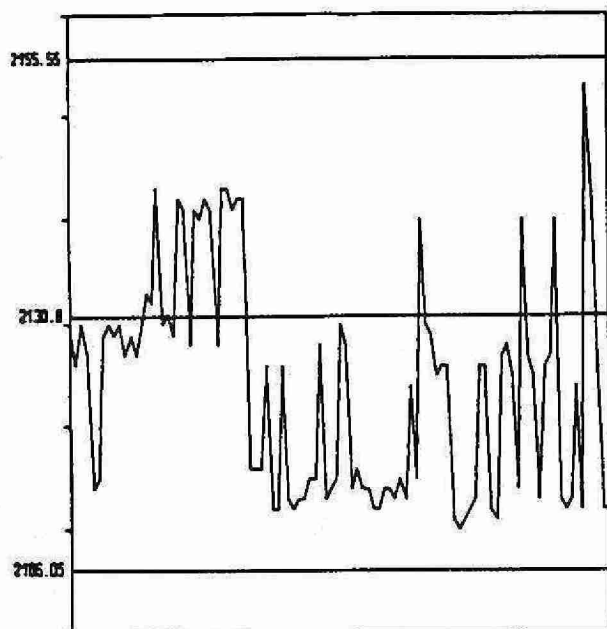
2106.05	-	2155.55	for	A+B
687.70	-	711.70	for	A-B
851.48	-	878.12	for	C+D
561.92	-	579.68	for	C-D

DUPLICATES:

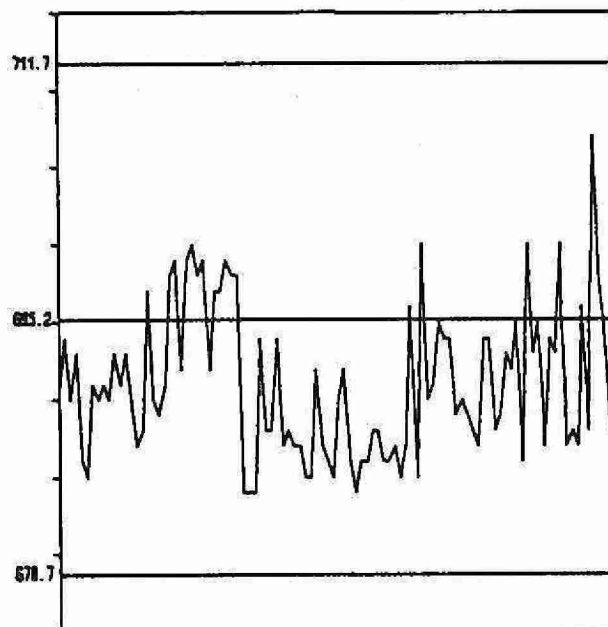
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
12	0	-	100	0.79	1.0
26	100	-	200	1.86	1.4
110	200	-	500	2.93	0.9
69	500	-	1000	4.45	0.6
31	1000	-	2000	13.05	0.9
248	Overall			3.57	

CONDUCTIVITY - WATS (uS/CM)

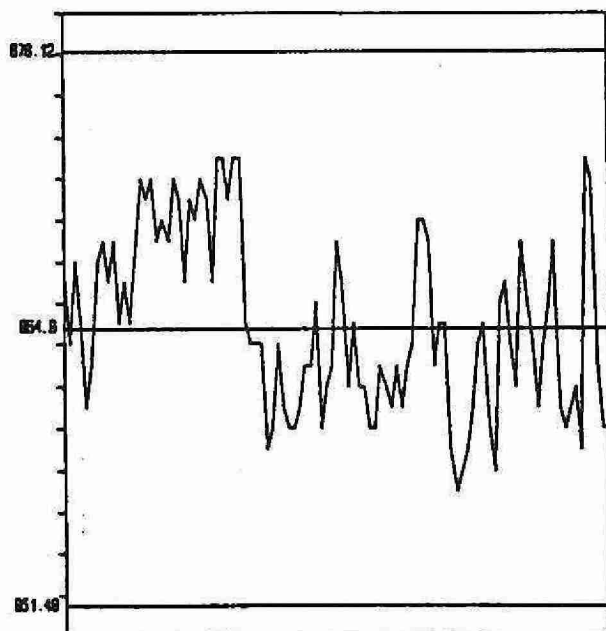
QUALITY CONTROL DATA FROM 23/01/89 TO 21/12/89



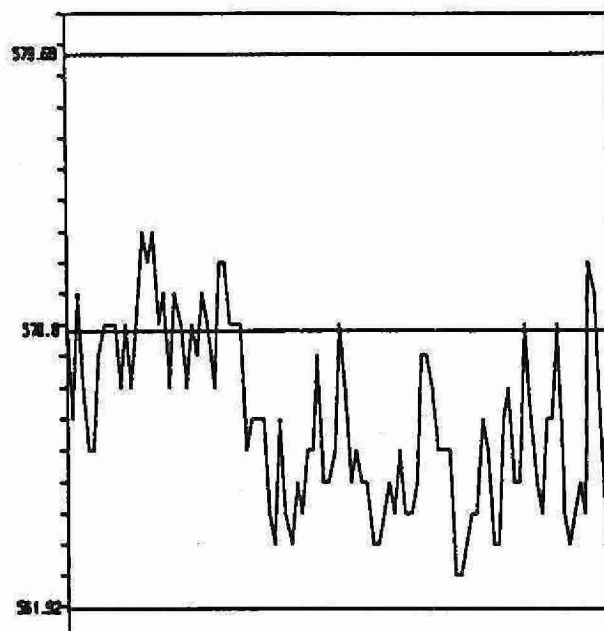
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 20/05/87
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WQSDIRT	Unit Code	: 350351
Method Code	: 004AB4	Supervisor	: F. Lo
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 75 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured; samples are filtered first if necessary. Analysis is performed on supernatant or filtrate.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 5	T value: 25
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CONTROLS:

Calibration : BL plus 4 standards, e.g. QCA

CONDUCTIVITY - WQSDIRT

QUALITY CONTROL DATA FROM 06/01/89 TO 18/12/89

Lab: Titration

Analytical Range: - to 10000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	37	6668.0	6630.5	-37.5	34.56
b :	37	2767.0	2756.1	-10.9	24.30
a+b :	37	9435.0	9386.6	-48.4	37.82
a-b :	37	3901.0	3874.5	-26.5	46.24
c :	37	1413.0	1413.2	0.2	10.01
d :	37	717.8	714.0	-3.8	4.59
c+d :	37	2130.0	2127.2	-2.8	12.30
c-d :	37	695.2	699.2	4.0	9.56

s.d.(AB) Sw(within run): 32.7 S(between runs): 29.9 S/Sw: 0.91

s.d.(CD) Sw(within run): 6.8 S(between runs): 7.8 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

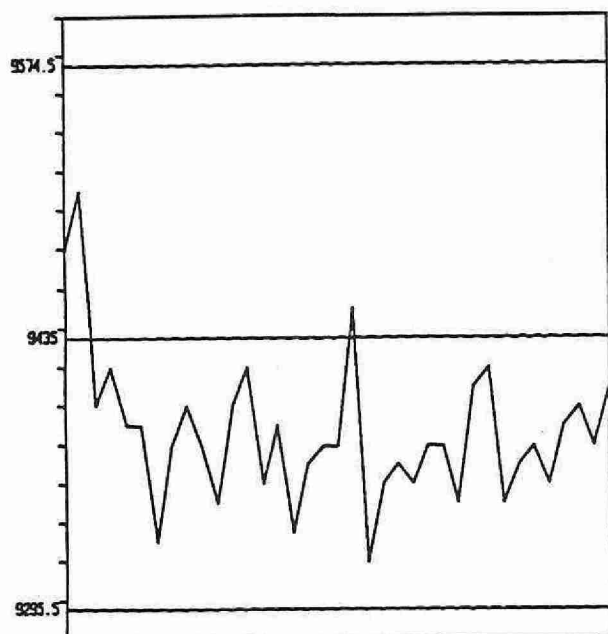
9295.5	-	9574.5	for	A+B
3808.0	-	3994.0	for	A-B
2089.98	-	2171.62	for	C+D
667.99	-	722.41	for	C-D

DUPLICATES:

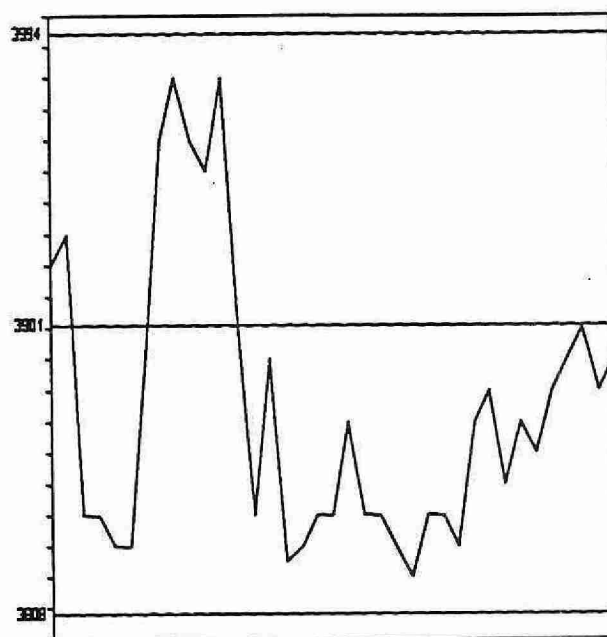
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
50	0 - 1000	3.13	0.7
23	1000 - 3000	5.96	0.6
0	3000 - 10000	N.A.	N.A.
73	Overall	3.95	

CONDUCTIVITY - WQSDIRT (uS/CM)

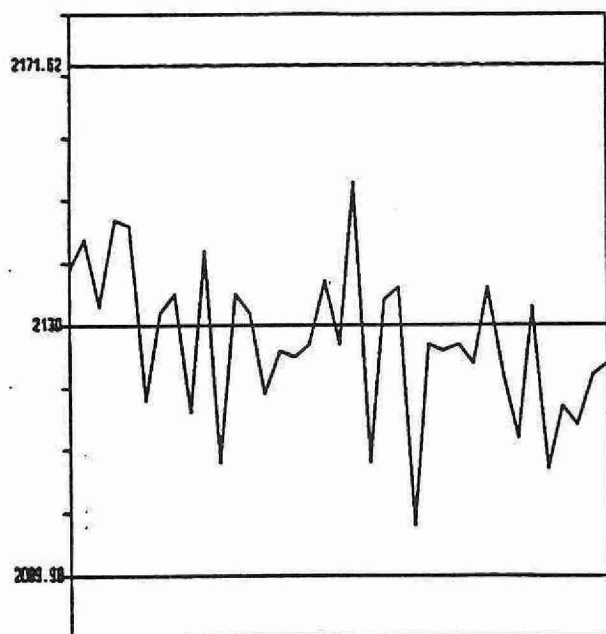
QUALITY CONTROL DATA FROM 06/01/89 TO 18/12/89



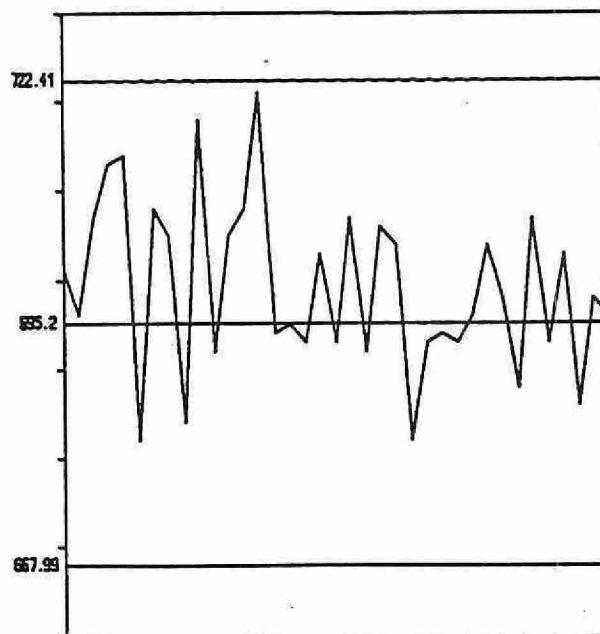
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** TOTAL COPPER *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/03/86
LIS Test Name Code	: CUUT	Units	: ug/L as Cu
Work Station Code	: DOASV	Unit Code	: 063882
Method Code	: 001PP2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 100 mL
Container : 500 mL, acid washed Nalgene Teflon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when copper is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

Metrohm 646 VA Processor with Model 675 VA Sample Changer

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.3 T value: 1.5

CALIBRATION:

BL plus 2 standards daily

CONTROL:

Calibration : BL plus 2 standards, e.g. QCA and EPA standard
Drift : End of every run (approximately every 8 samples)

TOTAL COPPER - DOASV

QUALITY CONTROL DATA FROM 04/01/89 TO 19/12/89

Lab: Dorset

Analytical Range: - to 4.00 ug/l as Cu

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	71	3.60	3.96	0.36	0.71
b :	71	0.90	1.39	0.49	0.63
a+b :	71	4.50	5.36	0.86	1.17
a-b :	71	2.70	2.57	-0.13	0.68

s.d.(AB) Sw(within run): 0.48 S(between runs): 0.67 S/Sw: 1.41

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54 - 8.46 for A+B
0.06 - 5.34 for A-B

DUPLICATES:

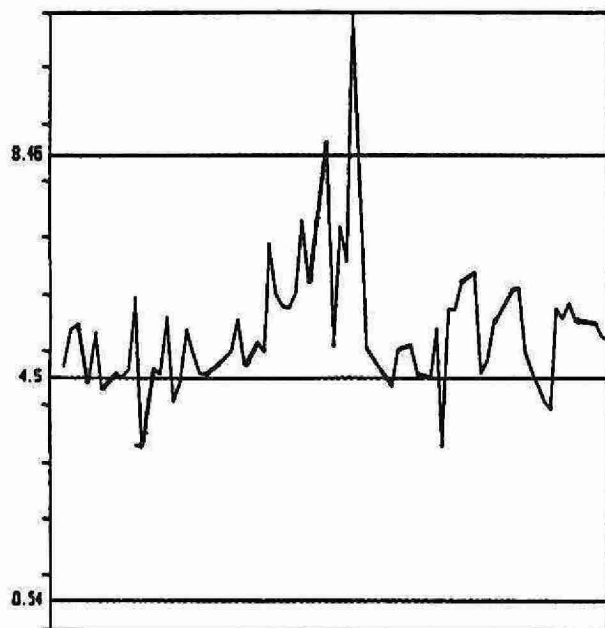
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.00 - 0.50	0.154	36.5
24	0.50 - 1.00	0.267	44.2
22	1.00 - 2.00	0.323	22.1
5	2.00 - 3.00	0.747	29.5
2	3.00 - 5.00	0.916	24.0
61	Overall	0.380	

OTHER CHECKS:

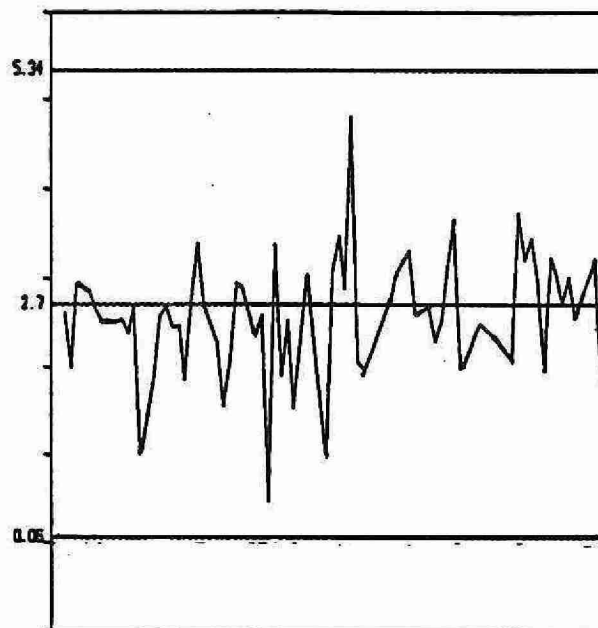
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	87	0.35	0.483

TOTAL COPPER - DOASV (UG/L AS Cu)

QUALITY CONTROL DATA FROM 04/01/89 TO 19/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** COPPER - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CUUT	Units	: ug/g as Cu
Work Station Code	: DOHMT	Unit Code	: 073829
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm. A subsample is ground to less than 500 um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Cu by AAS at 324.8 nm using an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale value.

Lead, nickel and zinc are also determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.2

T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks and one judiciously blended sample extract run
with each run.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

COPPER - DOHMT

QUALITY CONTROL DATA FROM 16/03/89 TO 07/11/89

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	37.0	37.3	0.3	0.78
b :	5	13.0	13.1	0.1	1.74
a+b :	5	50.0	50.4	0.4	2.27
a-b :	5	24.0	24.2	0.2	1.46

s.d.(AB) Sw(within run): 1.03 S(between runs): 1.35 S/Sw: 1.31

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.5 - 57.5 for A+B
19.0 - 29.0 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	14.3	0.98
R2 :	5	16.9	0.66
R2 :	5	13.5	0.86

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.0 - 10.0	0.62	6.4
4	10.0 - 20.0	0.50	3.4
3	20.0 - 50.0	0.83	2.4
12	Overall	0.64	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	5	-0.02	0.295

***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FFIDUR	Units	: ug/L as F
Work Station Code	: DOSPF	Unit Code	: 063809
Method Code	: 001AIE	Supervisor	: A. Neary
Sample Type/Matrix	: Precipitation, Lakes, and Streams		

SAMPLING:

Quantity Required	: 50 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Fluoride is determined via an automated flow system for which the detector is a specific ion electrode; prior to measurement the sample is mixed with a high ionic strength buffer containing; sodium citrate, disodium ethylenediaminetetraacetate (EDTA), phosphoric acid, and sufficient sodium hydroxide to obtain pH 6.7.

INSTRUMENTATION:

Automated modular continuous flow ion specific electrode system.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL plus 1 standard in duplicate
Interference	: Combined fluoride and aluminum standard confirms that aluminum is not an interference.

NOTES:

At the present time this procedure is restricted to special projects. Values for recoveries are based upon the average recovery value obtained.

FLUORIDE - DOSPF

QUALITY CONTROL DATA FROM 03/01/89 TO 21/12/89

Lab: Dorset Soils

Analytical Range: - to 70.0 ug/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	69	48	47.8	-0.2	1.06
b :	69	24	24.0	0.0	0.89
a+b :	69	72	71.9	-0.1	1.46
a-b :	69	24	23.8	-0.2	1.30

s.d.(AB) Sw(within run): 0.85 S(between runs): 0.96 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

67.5 - 76.5 for A+B
21.0 - 27.0 for A-B

DUPLICATES:

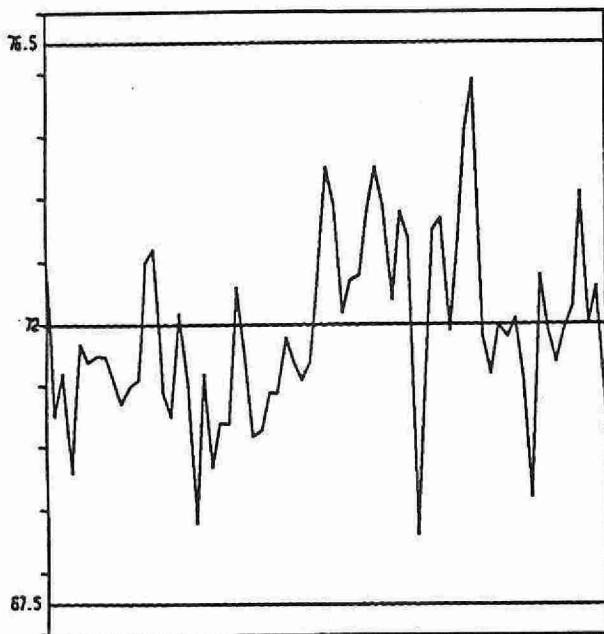
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
27	0.0 - 20.0	0.75	7.4
120	20.0 - 50.0	0.86	2.2
45	50.0 - 70.0	0.91	1.4
192	Overall	0.86	

OTHER CHECKS:

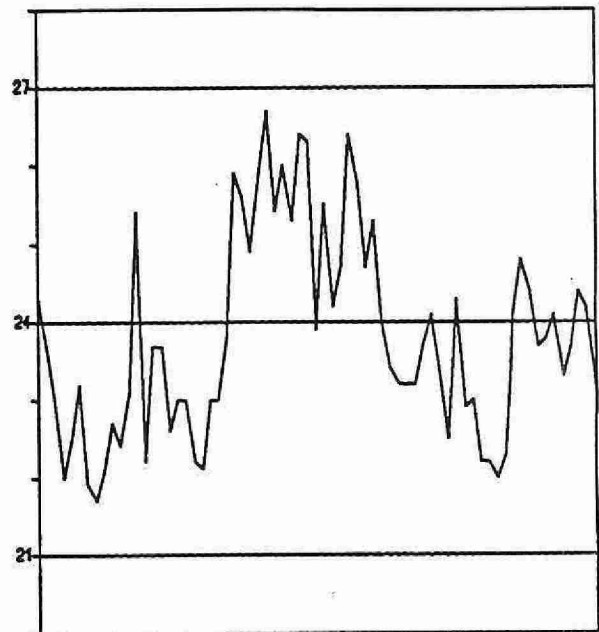
	Number of Data	Data Mean	Standard(1) Deviation
Al Interference	69	59.22	1.06

FLUORIDE - SOIL - DOSPF (UG/L AS F)

QUALITY CONTROL DATA FROM 03/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
LIS Test Name Code	: FFIDUR	Units	: mg/L as F
Work Station Code	: WFNO3	Unit Code	: 064809
Method Code	: 003AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Surface Waters, Leachates, Effluents		

SAMPLING: .

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated flow system the sample is distilled in the presence of sulphuric acid at 160°C; the distillate is then reacted (in an acetic acid-acetate buffer media) with Alizarin Fluorine Blue and lanthanum nitrate to form a ternary Alizarin Blue-lanthanide-fluoride complex.
Approximate absorbance: 0.8 at the full scale level.

INSTRUMENTATION:

Modular continuous flow colourimetric system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

FLUORIDE - WFNO3

QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	114	1.6	1.603	-0.003	0.2592
b :	114	0.8	0.807	0.007	0.0122
a+b :	114	2.4	2.411	0.011	0.0322
a-b :	114	0.8	0.797	-0.003	0.0246
c :	114	0.8	0.807	-0.007	0.0122
d :	114	0.16	0.161	0.001	0.0082
c+d :	114	0.96	0.968	-0.008	0.0152
c-d :	114	0.64	0.646	-0.006	0.0141

s.d.(AB) Sw(within run): 0.017 S(between runs): 0.020 S/Sw: 1.16

s.d.(CD) Sw(within run): 0.010 S(between runs): 0.010 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.28	-	2.52	for	A+B
0.72	-	0.88	for	A-B
0.91	-	1.01	for	C+D
0.59	-	0.69	for	C-D

DUPLICATES:

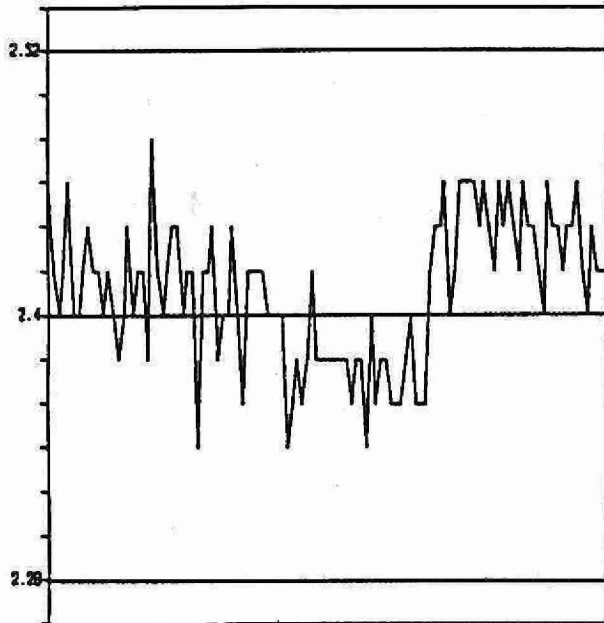
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
225	0.00	-	0.20	0.0158	21.8
40	0.20	-	0.50	0.0083	2.8
30	0.50	-	1.00	0.0146	1.7
37	1.00	-	2.00	0.0180	1.5
332	Overall			0.0153	

OTHER CHECKS:

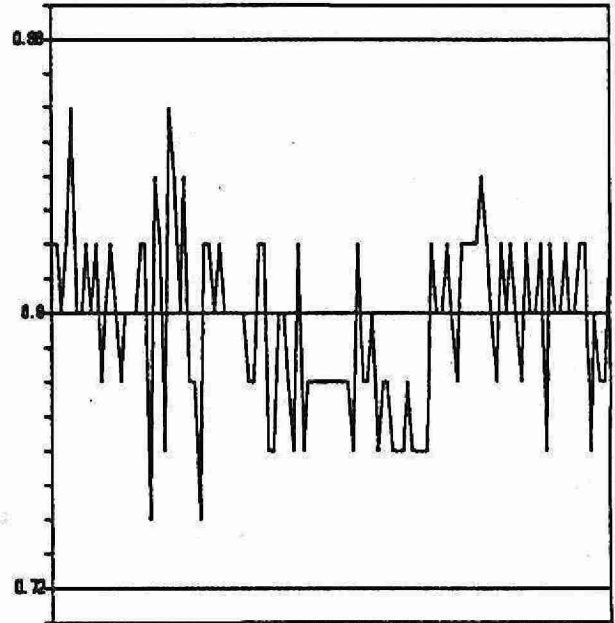
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	114	-0.0005	0.0082

FLUORIDE - WFNO3 (MG/L AS F)

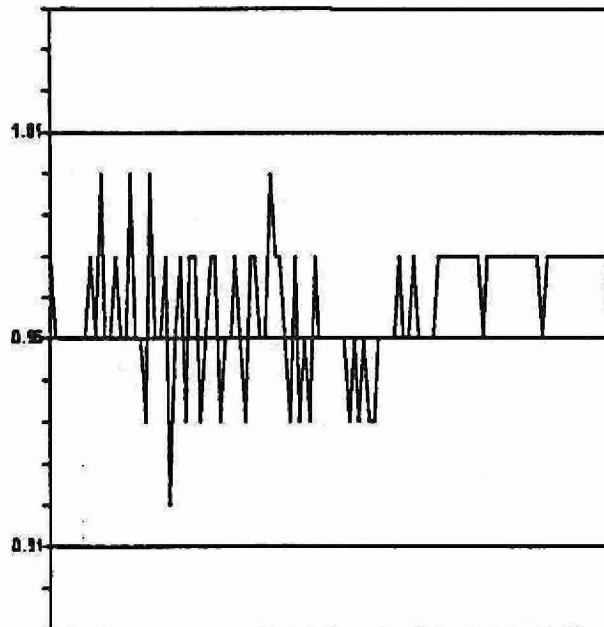
QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89



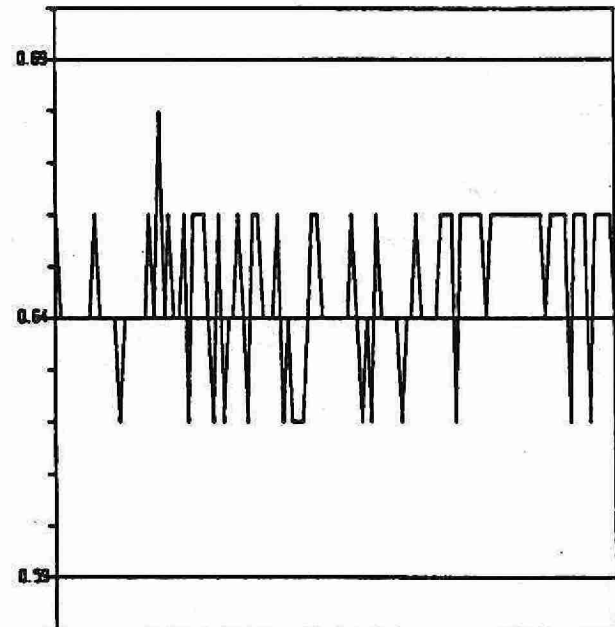
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: RMAAS	Unit Code	: 064915
Method Code	: CALC10	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by atomic absorption spectroscopy (AAS) at RMAAS.
Hardness is calculated using the formula:
$$\text{HARDT} = (\text{CAUR} * 2.497) + (\text{MGUR} * 4.116)$$

INSTRUMENTATION:

Automated flow injection AAS.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

Refer to Calcium and Magnesium tests at RMAAS

CONTROLS:

Refer to Calcium and Magnesium tests at RMAAS

***** HARDNESS *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: WAAS	Unit Code	: 064915
Method Code	: CALC01	Supervisor	: M. Young
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by atomic absorption spectroscopy (AAS) at WAAS.
Hardness is calculated using the formula:
$$\text{HARDT} = (\text{CAUR} * 2.497) + (\text{MGUR} * 4.116)$$

INSTRUMENTATION:

Automated flow injection AAS.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

Refer to Calcium and Magnesium tests at WAAS

CONTROLS:

Refer to Calcium and Magnesium tests at WAAS

***** EXTRACTABLE IRON - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEDI	Units	: % by weight Fe
Work Station Code	: DOMETDI	Unit Code	: 070826
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated, and passed through a 2mm sieve. A subsample is ground and sieved to <500um. (35 mesh).

ANALYTICAL PROCEDURE:

Iron is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 248.3 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Aluminum is determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of scale; 2 method blanks; round robin CSSC samples (run occasionally).

Drift: BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

EXTRACTABLE IRON - DOME TDI

QUALITY CONTROL DATA FROM 01/31/89 TO 11/02/89

Lab: Dorset Soils

Analytical Range: - to 2.00 % wt Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	1.5	1.50	0.00	0.024
b :	5	0.5	0.49	-0.01	0.011
a+b :	5	2.0	1.98	-0.02	0.029
a-b :	5	1.0	1.01	0.01	0.023

s.d.(AB) Sw(within run): 0.017 S(between runs): 0.019 S/Sw:1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.85 - 2.15 for A+B
0.90 - 1.10 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	1.18	0.015
R2 :	5	0.71	0.030
R2 :	5	0.44	0.024

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.40	N.A.	N.A.
9	0.40 - 1.00	0.030	5.1
2	1.00 - 2.00	0.057	N.A.
12	Overall	0.008	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	5	0	0

***** EXTRACTABLE IRON - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: FEEOX	Units	: % by wt as Fe
Work Station Code	: DOMETOX	Unit Code	: 070826
Method Code	: 302AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 1 g
Container	: Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2mm. a subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275

REPORTING:

Maximum Significant Figures: 2 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration:	Three long term soil samples representing different soil types, 2 method blanks, 2 QC solutions at 25% and 75% of scale, round robin ECSS samples.
Drift:	BL plus 1 standard (100% F.S.) every 10 samples.

EXTRACTABLE IRON - DOMETOX

QUALITY CONTROL DATA FROM 27/01/89 TO 03/11/89

Lab: Dorset Soils

Analytical Range: - to 2.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	3	1.50	1.46	-0.04	0.021
b :	3	0.50	0.49	-0.01	0.029
a+b :	3	2.00	1.96	-0.04	0.050
a-b :	3	1.00	0.97	-0.03	0.010

s.d.(AB) Sw(within run): 0.007 S(between runs): 0.252 S/Sw: 3.56

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.70 - 2.30 for A+B
0.80 - 1.20 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.927	0.116
R2 :	3	0.517	0.404
R3 :	3	0.353	0.015

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
3	0.00 - 0.40	0.011	4.7
1	0.40 - 1.00	N.A	N.A
0	1.00 - 2.00	N.A	N.A
4	Overall	0.012	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0	0

*** EXTRACTABLE IRON - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEPY	Units	: % by weight Fe
Work Station Code	: DOMETALX	Unit Code	: 070826
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.6 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to < 2mm. A subsample is ground to <500um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 248.3 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

Aluminum and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of scale; 2 method blanks; round robin ECSS samples (run occasionally).

Drift: BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

EXTRACTABLE IRON - DOMETALX

QUALITY CONTROL DATA FROM 01/26/89 TO 11/01/89

Lab: Dorset Soils

Analytical Range: - to 1.00 % by wt as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	0.75	0.754	-0.004	0.013
b :	5	0.25	0.246	-0.004	0.005
a+b :	5	1.00	1.000	-0.000	0.019
a-b :	5	0.50	0.508	0.008	0.008

s.d.(AB) Sw(within run): 0.006 S(between runs): 0.01 S/Sw:1.73

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.93 - 1.07 for A+B
0.45 - 0.55 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	0.610	0.018
R2 :	4	0.327	0.013
R2 :	4	0.165	0.006

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.00 - 0.20	0.007	6.4
5	0.20 - 0.50	0.021	6.0
0	0.50 - 1.00	N.A.	N.A.
12	Overall	0.011	

***** TOTAL LEAD *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/03/86
LIS Test Name Code	: PBUT	Units	: ug/L as Pb
Work Station Code	: DOASV	Unit Code	: 063882
Method Code	: 001PP2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 100 mL
Container	: 500 mL, acid washed Nalgene Teflon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a rotating glassy carbon disk. Change in current when lead is stripped from the glassy carbon disk is proportional to concentration.

INSTRUMENTATION:

EG & G 384B polarographic Analyzer with a Rotel 2 Glassy Carbon Rotating disk electrode.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.3	T value: 1.5
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CALIBRATION:

BL plus 2 standards daily

CONTROL:

Calibration	: BL plus 2 standards, e.g. QCA and EPA standard
Drift	: End of every run (approximately every 8 samples)

TOTAL LEAD - DOASV

QUALITY CONTROL DATA FROM 04/01/89 TO 19/12/89

Lab: Dorset

Analytical Range: - to 2.000 ug/L as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	99	0.40	0.455	0.055	0.1036
b :	99	0.24	0.241	0.001	0.0696
a+b :	99	0.64	0.697	0.057	0.1450
a-b :	99	0.16	0.214	0.054	0.1010

s.d.(AB) Sw(within run): 0.07 S(between runs): 0.09 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.19 - 1.09 for A+B
-0.14 - 0.46 for A-B

DUPLICATES:

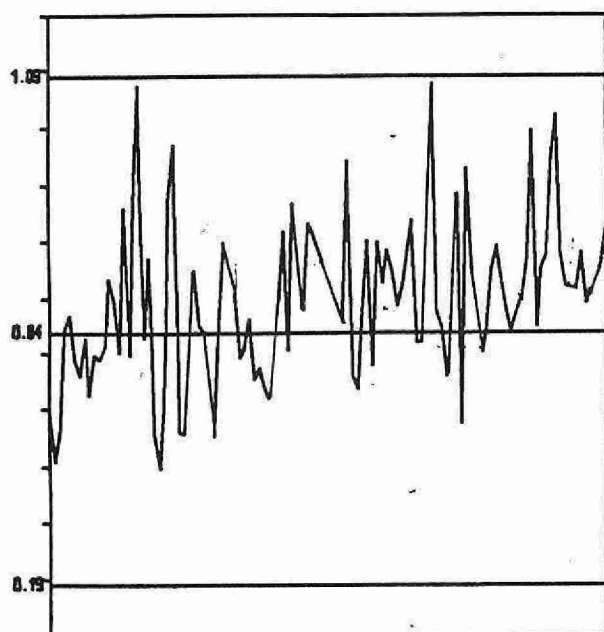
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
10	0.0 - 0.10	0.0173	61.9
17	0.10 - 0.20	0.0339	26.8
20	0.20 - 0.50	0.0445	14.8
8	0.50 - 1.00	0.1392	18.0
14	1.00 - 2.00	0.4606	28.4
69	Overall	0.0920	

OTHER CHECKS:

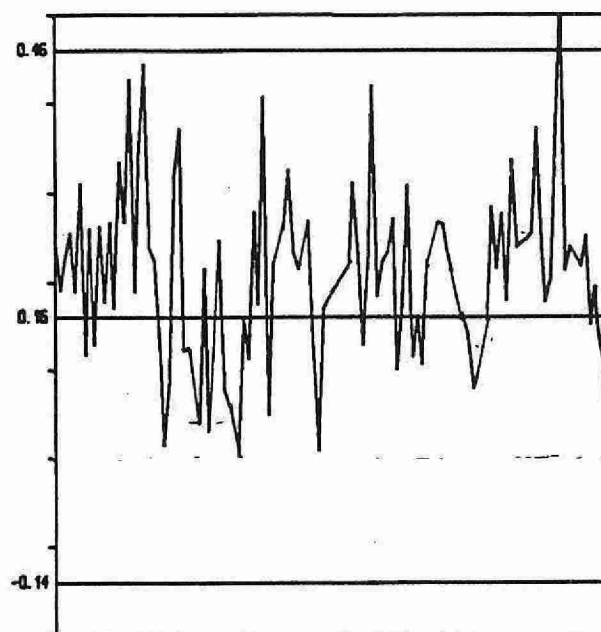
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	112	0	0

TOTAL LEAD - DOASV (UG/L AS Pb)

QUALITY CONTROL DATA FROM 04/01/89 TO 19/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** LEAD - SOIL ***

IDENTIFICATION:

Laboratory : Dorset Soils
LIS Test Name Code : PBUT
Work Station Code : DOHMTE
Method Code : 551AA1
Sample Type/Matrix : Soil

Method Introduced : 01/06/80
Units : ug/g as Pb
Unit Code : 073882
Supervisor : A. Neary

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to $<2\text{mm}$. A subsample is ground to $<500\mu\text{m}$ (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Pb by AAS at 217.0 nm using an air-acetylene flame.

Approximate absorbance: 0.1 at the full scale value.

Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.2

T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types; one judiciously blended sample digest run with each run; 2 method blanks.

Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

LEAD - DOHMT

QUALITY CONTROL DATA FROM 16/03/89 TO 07/11/89

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	39.00	37.58	-1.42	1.95
b :	5	16.50	13.74	-2.76	1.78
a+b :	5	55.50	51.32	-4.18	2.50
a-b :	5	22.50	23.84	1.34	2.77

s.d.(AB) Sw(within run): 1.96 S(between runs): 1.87 S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

40.5 - 70.5 for A+B
12.5 - 32.5 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	10.42	1.89
R2 :	5	20.64	1.69
R3 :	5	28.12	0.57

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
10	0.00 - 12.50	1.54	17.6
1	12.50 - 25.00	N.A	N.A
1	25.00 - 50.00	N.A	N.A
12	Overall	1.99	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	5	0.9	2.05

***** EXCHANGEABLE MAGNESIUM - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: MGESC	Units	: meq/100 g
Work Station Code	: DOCACTION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to ≤ 2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Mg by AAS at 285.2 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level.

Aluminum, calcium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).

Drift: BL plus 1 standard (100% Full Scale) every 10 samples.

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

EXCHANGEABLE MAGNESIUM - DOCAATION

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	28	1.88	1.88	0.00	0.032
b :	28	0.63	0.60	-0.03	0.018
a+b :	28	2.50	2.48	-0.02	0.038
a-b :	28	1.25	1.28	0.03	0.035

s.d.(AB) Sw(within run): 0.025 S(between runs): 0.026 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 - 2.69 for A+B
1.13 - 1.37 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	28	0.632	0.042
R2 :	25	0.494	0.033
R2 :	28	0.169	0.025

DUPLICATES:

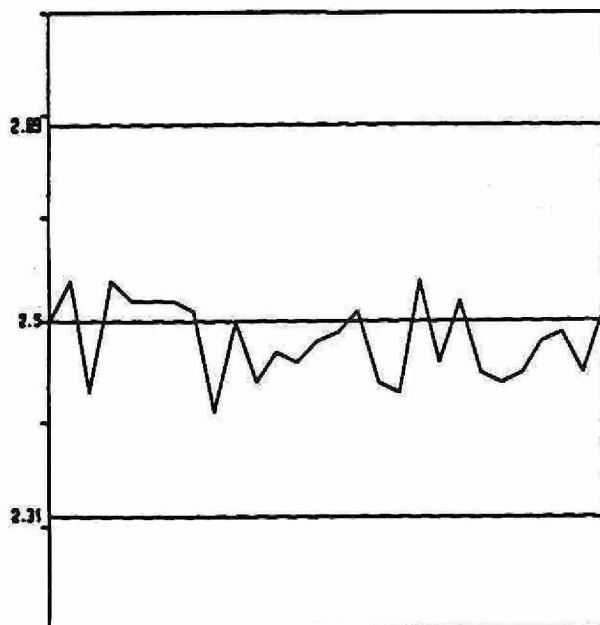
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
26	0.00 - 0.50	0.025	10.3
46	0.50 - 1.25	0.034	5.0
12	1.25 - 2.50	0.038	2.1
84	Overall	0.032	

OTHER CHECKS:

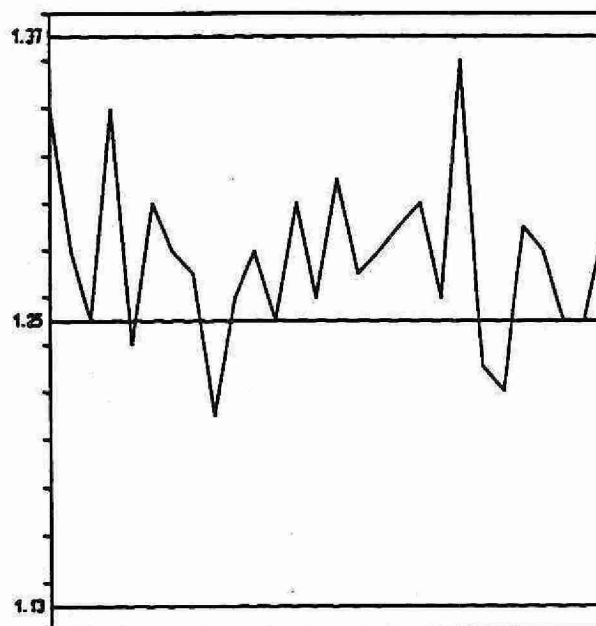
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	28	0.0004	0.0019

EXCHANGEABLE MAGNESIUM - SOIL - LOCATION (MEQ/G)

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAA	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: M. Young
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.005

T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

27/11/89 - Analytical System switched to SpectrAA-400, an automated AAS with an IBM PC/2 Model 30 computer to provide instrument control, data processing and mainframe communications, with BL plus 5 standards

MAGNESIUM - PRAA

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89

Lab: Atomic Absorption

Analytical Range: - to 0.500 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	76	0.30	0.301	0.001	0.004
b :	76	0.05	0.050	0.000	0.002
a+b :	76	0.35	0.351	0.001	0.004
a-b :	76	0.25	0.252	0.002	0.004

s.d.(AB) Sw(within run): 0.003 S(between runs): 0.003 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.325 - 0.375 for A+B
0.235 - 0.265 for A-B

DUPLICATES:

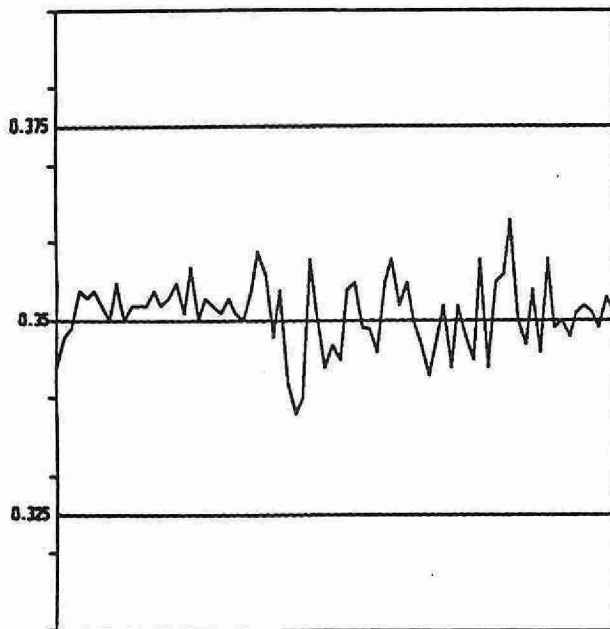
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
138	0.00 - 0.05	0.0008	4.6
31	0.05 - 0.10	0.0013	2.0
24	0.10 - 0.20	0.0016	1.0
6	0.20 - 0.30	0.0033	1.2
6	0.30 - 0.50	0.0074	1.7
205	Overall	0.0011	

OTHER CHECKS:

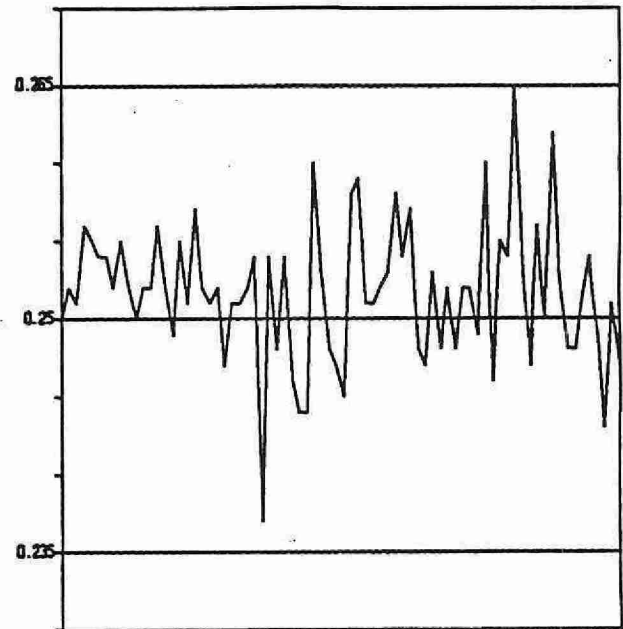
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	76	0.0	0.001
Absorbance	50	0.84	0.341

MAGNESIUM - PRAA (MG/L AS Mg)

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Pet 500 mL Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated injection modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: 2 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

MAGNESIUM - PRAAS

QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89

Lab: Atomic Absorption

Analytical Range: - to 2.0 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	56	1.6	1.607	0.007	0.016
b :	56	0.4	0.403	0.003	0.005
a+b :	56	2.0	2.010	-0.010	0.019
a-b :	56	1.2	1.205	-0.005	0.015
c :	56	0.4	0.403	0.003	0.005
d :	56	0.1	0.101	-0.001	0.003
c+d :	56	0.5	0.504	0.004	0.007
c-d :	56	0.3	0.301	-0.001	0.004

s.d.(AB) Sw(within run): 0.011 S(between runs): 0.012 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.003 S(between runs): 0.004 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91	-	2.09	for	A+B
1.14	-	1.26	for	A-B
0.41	-	0.59	for	C+D
0.24	-	0.36	for	C-D

DUPLICATES:

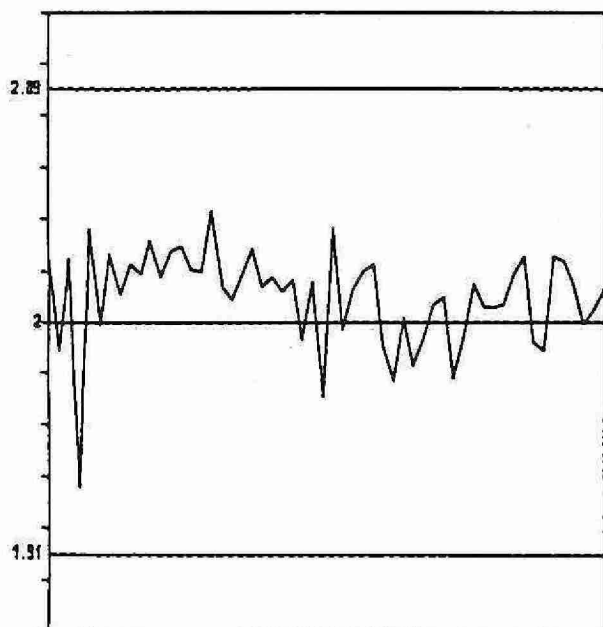
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.00 - 0.40	0.0011	0.5
16	0.40 - 0.50	0.0037	0.8
64	0.50 - 1.00	0.0087	1.7
35	1.00 - 1.50	0.0104	0.9
15	1.50 - 2.00	0.0116	1.2
139	Overall	0.0084	

OTHER CHECKS:

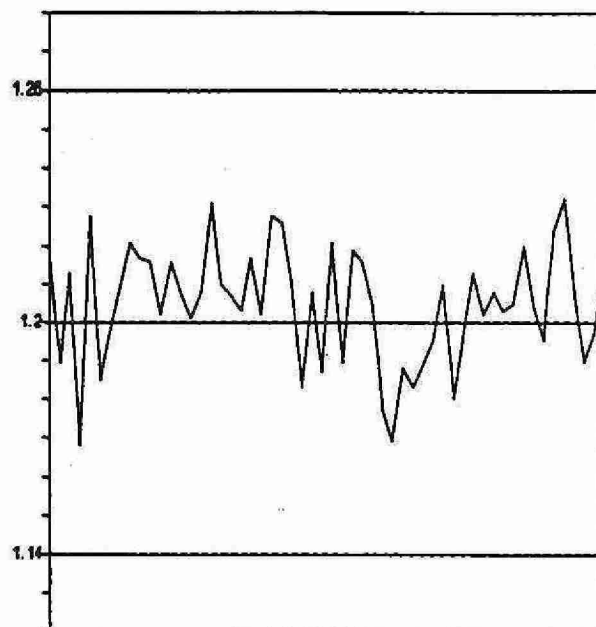
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	56	0.0002	0.0018
Absorbance	49	1.2751	0.9863

MAGNESIUM - PRAAS (MG/L AS Mg)

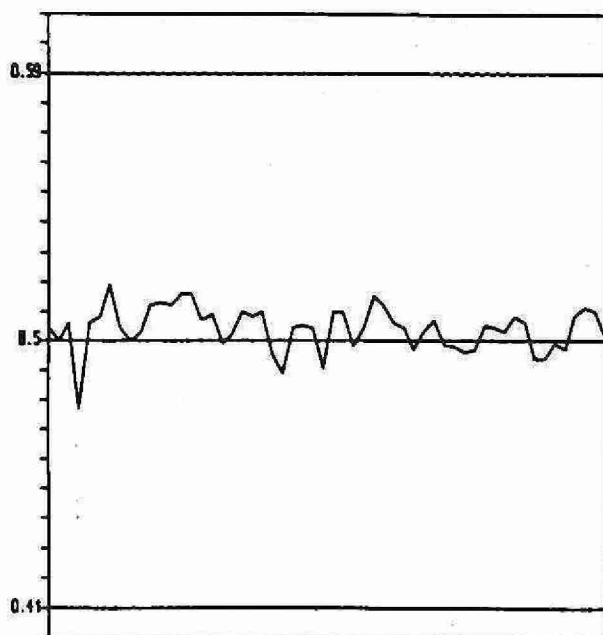
QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89



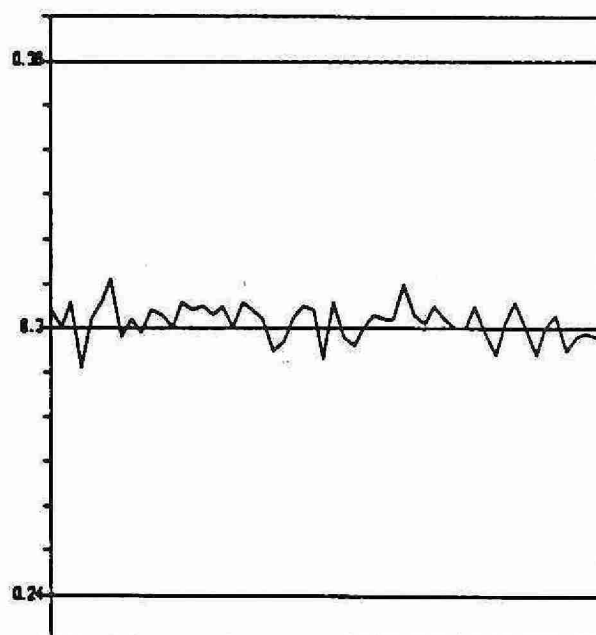
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: RMAAS	Unit Code	: 064812
Method Code	: 0901A1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Pet 500mL Jar

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.19 at the full scale level

INSTRUMENTATION:

Automated flow injection AAS system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MAGNESIUM - RMAAS

QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89

Lab: Atomic Absorption

Analytical Range: - to 10.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	88	8.00	7.95	-0.05	0.078
b :	88	2.00	2.01	0.01	0.031
a+b :	88	10.00	9.96	-0.04	0.089
a-b :	88	6.00	5.94	-0.06	0.079
c :	88	2.00	2.01	0.01	0.031
d :	88	0.50	0.50	0.00	0.020
c+d :	88	2.50	2.51	0.01	0.045
c-d :	88	1.50	1.51	0.01	0.027

s.d.(AB) Sw(within run): 0.056 S(between runs): 0.060 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.019 S(between runs): 0.036 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55	-	10.45	for	A+B
5.70	-	6.30	for	A-B
2.30	-	2.70	for	C+D
1.37	-	1.63	for	C-D

DUPLICATES:

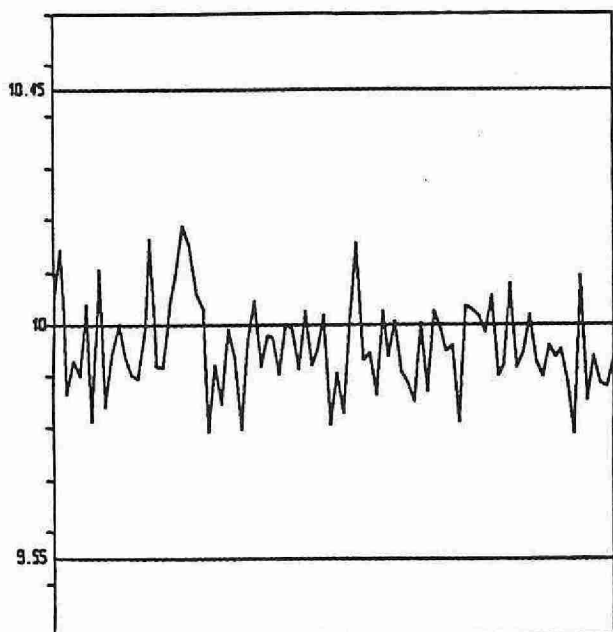
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
64	0.00 - 1.00	0.024	3.8
41	1.00 - 2.00	0.026	2.0
31	2.00 - 4.00	0.044	1.4
25	4.00 - 7.00	0.061	1.0
35	7.00 - 10.00	0.087	1.0
196	Overall	0.041	

OTHER CHECKS:

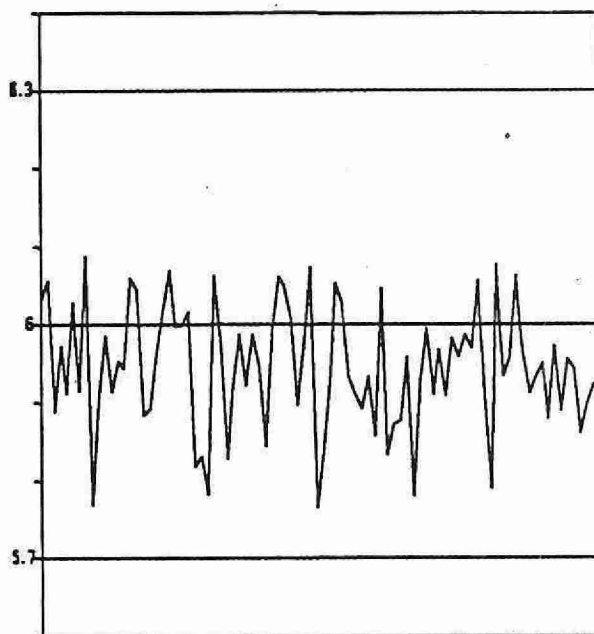
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	85	-0.117	0.892
Absorbance	86	1.152	0.056

MAGNESIUM - RMAAS (MG/L AS Mg)

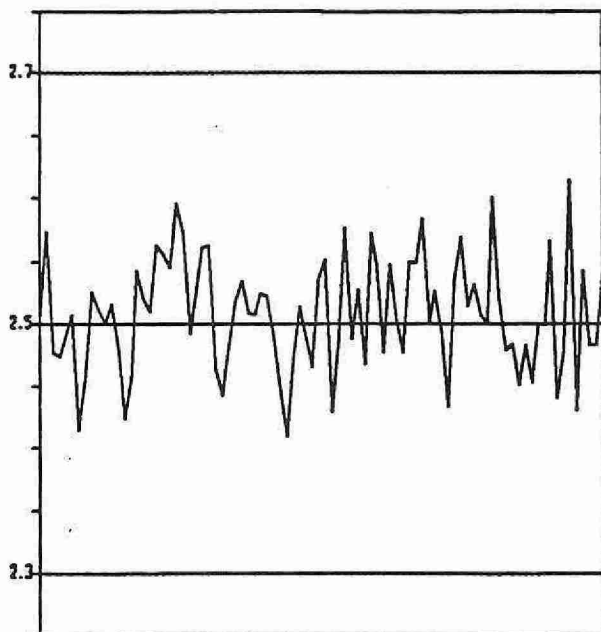
QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89



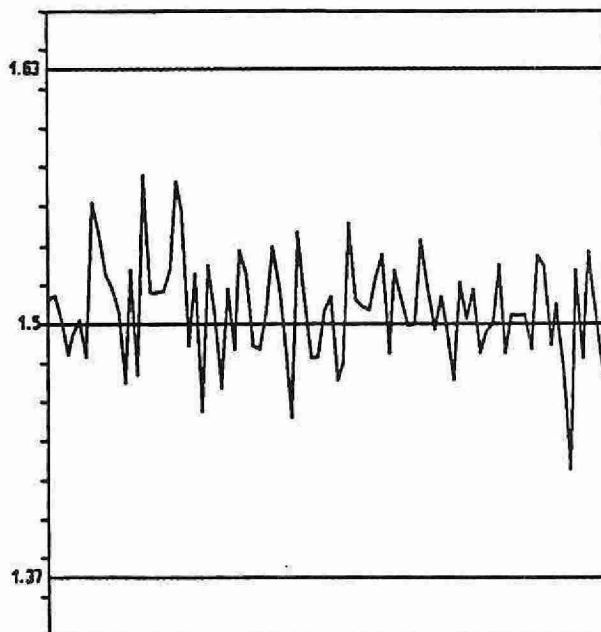
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	08/04/86
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: WAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: M. Young
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 mL Jar

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.187 at the full scale level.

INSTRUMENTATION:

Automated flow injection AAS system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/11/89 -Everex system 1800 microcomputer and software system introduced

MAGNESIUM - WAAS

QUALITY CONTROL DATA FROM 05/01/89 TO 27/12/89

Lab: Atomic Absorption

Analytical Range: - to 50.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	150	40.0	40.11	-0.11	0.479
b :	150	10.0	10.05	0.05	0.171
a+b :	150	50.0	50.15	0.15	0.504
a-b :	150	30.0	30.06	0.06	0.513
c :	150	10.0	10.05	-0.05	0.171
d :	150	2.5	2.53	-0.03	0.100
c+d :	150	12.5	12.58	-0.08	0.220
c-d :	150	7.5	7.52	0.02	0.174

s.d.(AB) Sw(within run): 0.36 S(between runs): 0.36 S/Sw:1.0

s.d.(CD) Sw(within run): 0.12 S(between runs): 0.14 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.75	-	52.75	for	A+B
28.80	-	31.50	for	A-B
11.45	-	13.55	for	C+D
6.80	-	8.20	for	C-D

DUPLICATES:

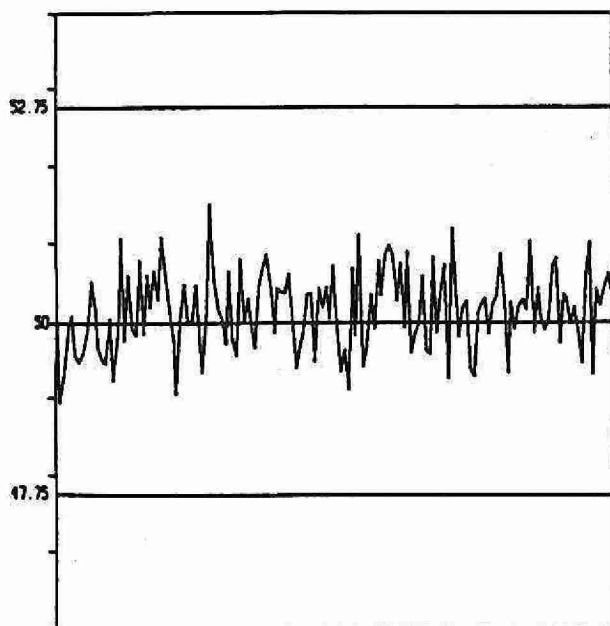
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
48	0.00	-	2.50	0.084	9.2
42	2.50	-	5.00	0.093	2.7
98	5.00	-	10.00	0.126	2.6
128	10.00	-	25.00	0.232	1.2
89	25.00	-	50.00	0.386	1.4
405	Overall			0.272	

OTHER CHECKS:

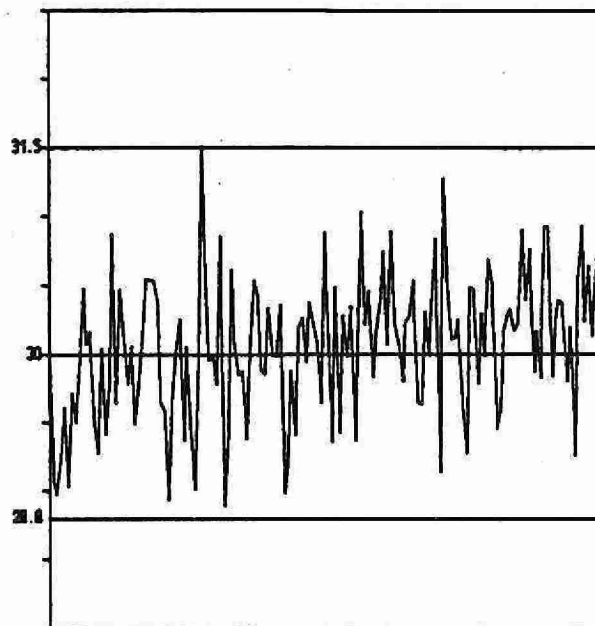
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	150	-0.002	0.0755
Absorbance	146	1.184	0.0616

MAGNESIUM - WAAS (MG/L AS Mg)

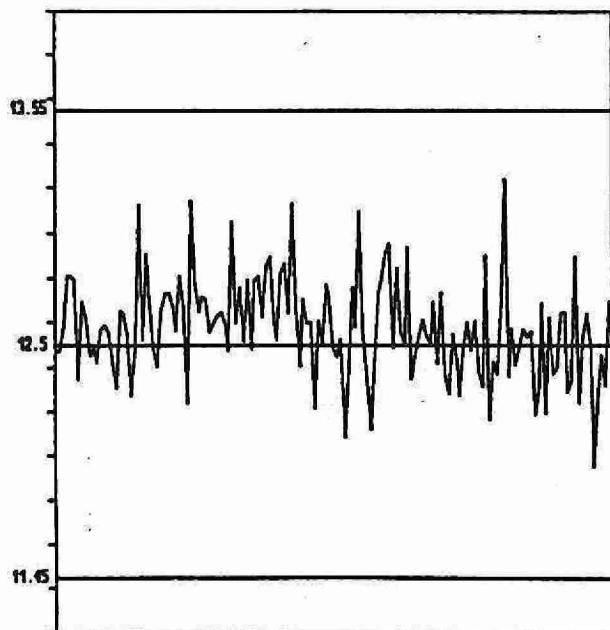
QUALITY CONTROL DATA FROM 05/01/89 TO 27/12/89



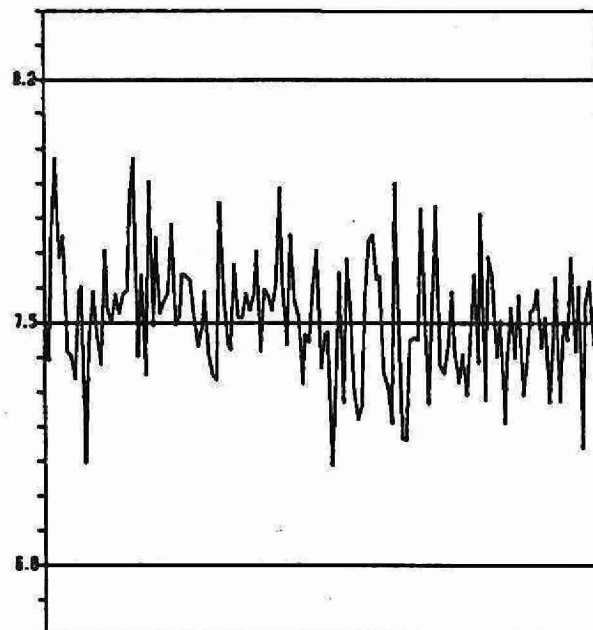
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** EXTRACTABLE MANGANESE - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: MNEOX	Units	: % by wt as Mn
Work Station Code	: DOMETOX	Unit Code	: 070825
Method Code	: 302AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 1 g
Container	: Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2mm. A subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.001	T value: 0.005
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three long term soil samples representing different soil samples, 2 method blanks, 2 QC solutions at 25% and 75% of scale, round robin ECSS samples.

Drift: BL plus 1 standard (100% F.S.) every 10 samples.

EXTRACTABLE MANGANESE - DOMETOX

QUALITY CONTROL DATA FROM 01/05/89 TO 03/11/89

Lab: Dorset Soils

Analytical Range: - to 1.00 % as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	2	0.075	0.074	-0.001	0.0014
b :	2	0.025	0.024	-0.001	0.0021
a+b :	2	0.100	0.098	-0.002	0.0007
a-b :	2	0.050	0.049	-0.001	0.0035

s.d.(AB) Sw(within run): 0.002 S(between runs): 0.002 S/Sw: 0.72

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.085 - 0.115 for A+B
0.040 - 0.060 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	2	0.127	0.0134
R2 :	1	N.A	N.A
R3 :	0	N.A	N.A

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.000 - 0.020	N.A	N.A
0	0.020 - 0.050	N.A	N.A
0	0.050 - 0.100	N.A	N.A
0	Overall	N.A	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	2	0	0

*** NICKEL - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: NIUT	Units	: ug/g as Ni
Work Station Code	: DOHMTE	Unit Code	: 073828
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm. A subsample is ground to <500um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Ni by AAS at 232.0 nm using an air-acetylene flame.

Approximate absorbance: 0.2 at the full scale value.

Copper, lead and zinc are also determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.2

T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks and one judiciously blended sample extract run
with each run.

Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

NICKEL - DOHMT

QUALITY CONTROL DATA FROM 06/01/89 TO 18/12/89

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g as Ni

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	36.30	34.72	-1.58	2.44
b :	5	13.50	11.62	-1.88	1.42
a+b :	5	49.80	46.34	-3.46	1.98
a-b :	5	22.80	23.10	0.30	3.47

s.d.(AB) Sw(within run): 2.46 S(between runs): 2.00 S/Sw: 0.81

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.3 - 57.3 for A+B
17.8 - 27.8 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	8.50	1.46
R2 :	5	30.02	1.92
R3 :	5	6.84	1.03

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.00 - 12.50	1.443	19.0
3	12.50 - 25.0	0.726	3.8
2	25.00 - 50.0	1.700	N.A.
11	Overall	1.396	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	5	0.62	0.934

*** NITROGEN-AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: NNHTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1524C2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required : 50 mL
Container : PET 500 mL Jar

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Approximate absorbance : 0.40 at the full scale level. Nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3

Current W value: 1

T value: 5

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration : LTBL plus 4 QC standards, e.g. QCA
Drift : BL every 10 samples and BL plus check standard every 20 samples

NITROGEN - AMMONIA + AMMONIUM - DONUT

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89

Lab: Dorset

Analytical Range: - to 1000 ug/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	116	750.0	747.9	-2.1	6.65
b :	116	250.0	247.4	-2.6	5.20
a+b :	116	1000.0	995.3	-4.7	9.54
a-b :	116	500.0	500.6	0.6	7.18
c :	116	75.0	73.6	-1.4	2.29
d :	116	25.0	24.6	-0.4	1.72
c+d :	116	100.0	98.2	-1.8	3.28
c-d :	116	50.0	49.0	-1.0	2.34

s.d.(AB) Sw(within run): 5.07 S(between runs): 5.97 S/Sw: 1.18

s.d.(CD) Sw(within run): 1.66 S(between runs): 2.02 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

970	-	1030	for	A+B
480	-	520	for	A-B
88	-	112	for	C+D
42	-	58	for	C-D

DUPLICATES:

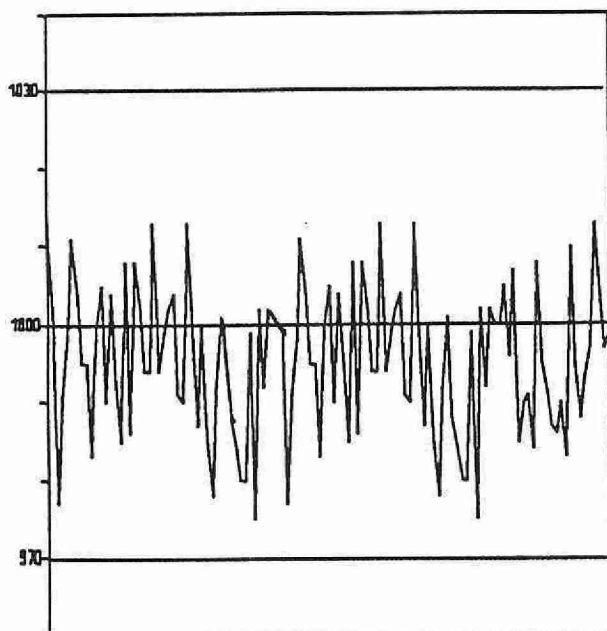
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
206	0.0	-	25.0	1.03	12.7
34	25.0	-	50.0	1.60	4.6
24	50.0	-	100.0	2.60	3.4
39	100.0	-	500.0	6.55	3.5
3	500.0	-	1000.0	19.40	2.6
306	Overall			1.59	

OTHER CHECKS:

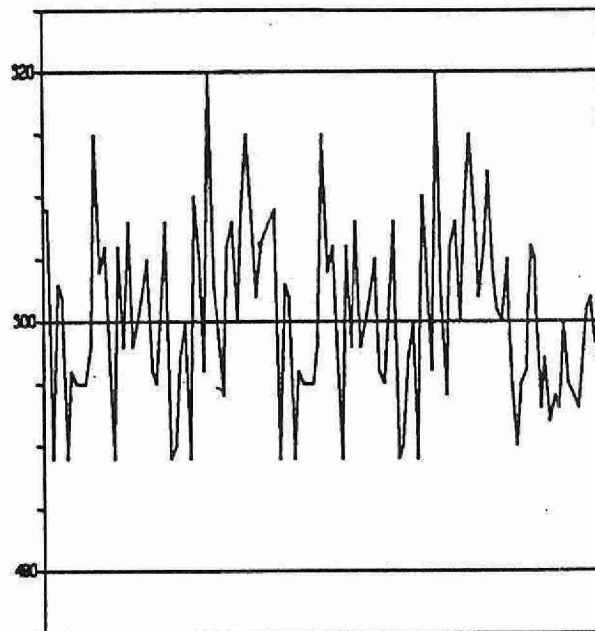
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	113	0.69	1.402
Absorbance	116	109.11	11.831

NITROGEN - AMMONIA PLUS AMMONIUM - DONUT (UG/L AS N)

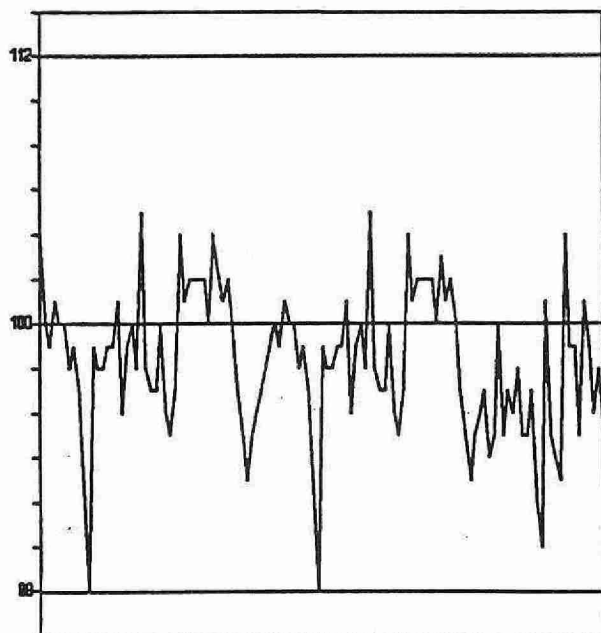
QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89



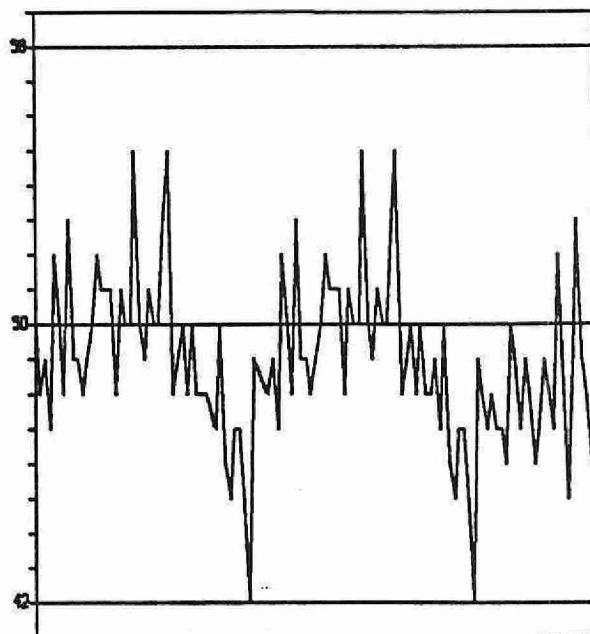
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR	Units	: ug/lt as N
Work Station Code	: PRAM	Unit Code	: 361807
Method Code	: 004A11	Supervisor	: M. Rawlings
Sample Type/Matrix	: Dry deposition air filter extracts		

SAMPLING:

Quantity Required	: 10 mL
Container	: 50 mL Polyethylene tube

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on an extract from a dry deposition air filter via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for precipitation, throughfall, and stemflow samples is also determined at this work station.

Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay), Colourimetric measurement is through a 1.5 cm light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

ALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples.

NITROGEN - AMMONIA PLUS AMMONIUM - PRAM - (NNHTFR)

QUALITY CONTROL DATA FROM 10/02/89 TO 21/12/89

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	125	40	40.210	0.210	0.368
b :	125	20	20.049	0.049	0.137
a+b :	125	60	60.259	0.259	0.401
a-b :	125	20	20.162	0.162	0.384
c :	125	20	20.049	0.049	0.137
d :	125	4	4.020	0.020	0.187
c+d :	125	24	24.069	0.069	0.256
c-d :	125	16	16.028	0.028	0.205

s.d.(AB) Sw(within run): 0.27 S(between runs): 0.27 S/Sw: 1.0

s.d.(CD) Sw(within run): 0.14 S(between runs): 0.16 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.0	-	25.0	for	C+D
15.4	-	16.6	for	C-D

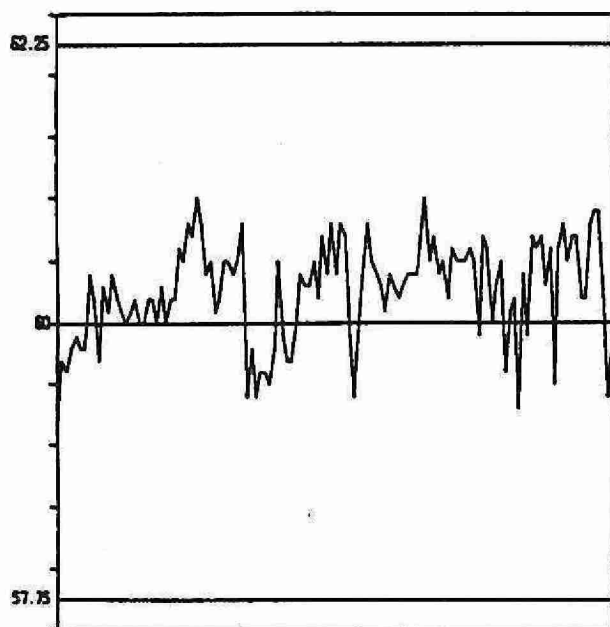
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
96	0.00	-	5.00	0.063	3.58
64	5.00	-	10.00	0.068	0.88
109	10.00	-	25.00	0.087	0.73
38	25.00	-	37.50	0.110	0.35
25	37.50	-	50.00	0.190	0.60
332	Overall			0.086	

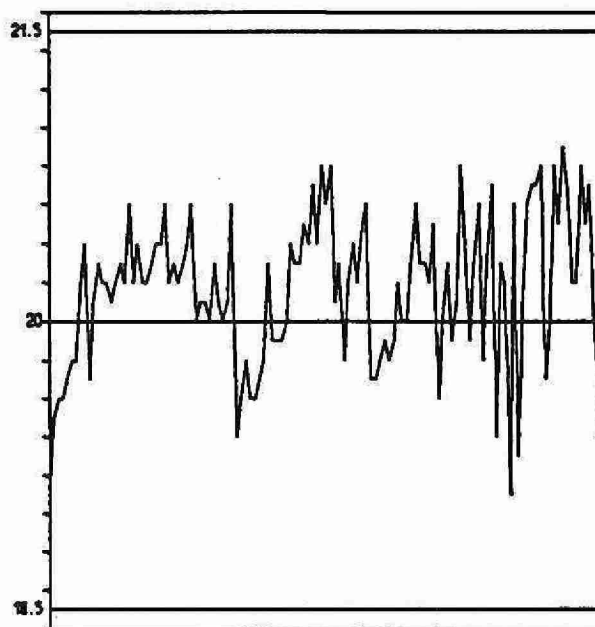
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	122	-0.009	0.064

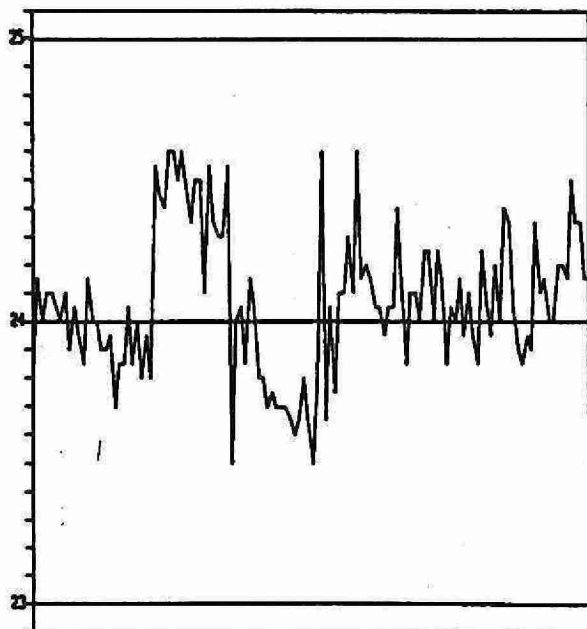
NITROGEN - AMMONIA PLUS AMMONIUM - PRAM (MG/L AS N)
(NNHTFR)
QUALITY CONTROL DATA FROM 10/02/89 TO 21/12/89



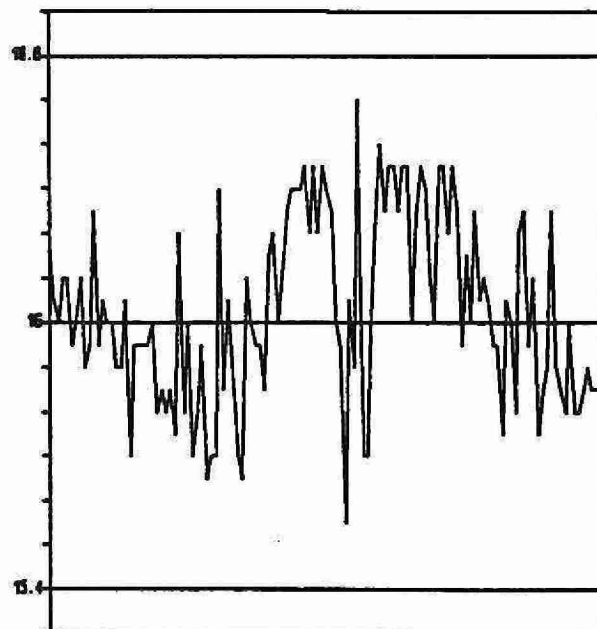
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

_____ CONTROL LIMIT

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: 500 mL Pet jars

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance: 0.5 at the full scale level.

Nitrate plus nitrite, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.002

T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA

Drift : BL every 10 samples; standard every 20 samples

NITROGEN-AMMONIA+AMMONTUM - RNDNP

QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	154	1.6	1.598	-0.002	0.0101
b :	154	0.8	0.802	0.002	0.0062
a+b :	154	2.4	2.400	0.000	0.0131
a-b :	154	0.8	0.797	-0.003	0.0106
c :	154	0.8	0.802	0.002	0.0062
d :	154	0.16	0.162	0.002	0.0048
c+d :	154	0.96	0.963	0.003	0.0084
c-d :	154	0.64	0.640	0.000	0.0072

s.d.(AB) Sw(within run): 0.007 S(between runs): 0.008 S/Sw: 1.14

s.d.(CD) Sw(within run): 0.005 S(between runs): 0.006 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.0	for	C+D
0.616	-	0.664	for	C-D

DUPLICATES:

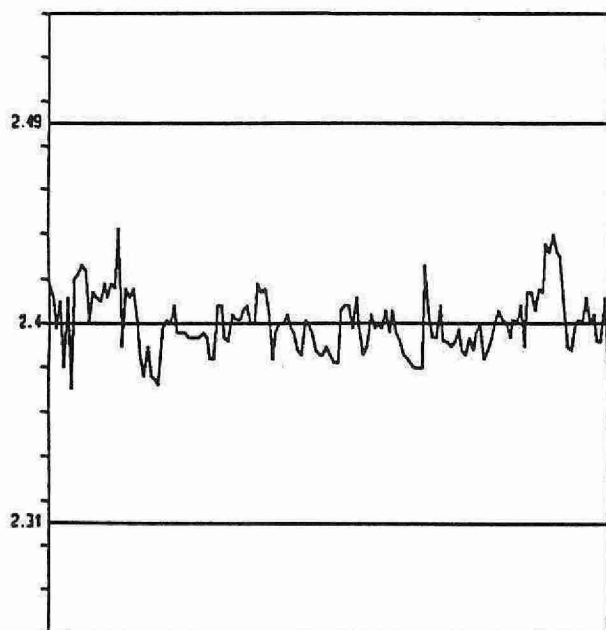
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
260	0.00	-	0.04	0.003	33.2
89	0.04	-	0.10	0.005	13.1
42	0.10	-	0.20	0.010	8.8
28	0.20	-	0.40	0.009	4.3
26	0.40	-	2.00	0.018	2.1
445	Overall			0.005	

OTHER CHECKS:

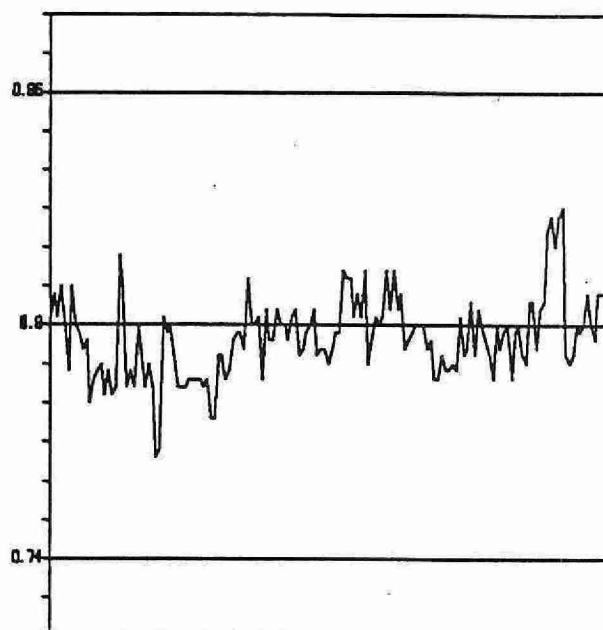
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	154	0.0019	0.0023

NITROGEN-AMMONIA PLUS AMMONIUM - RNDNP (MG/L AS N)

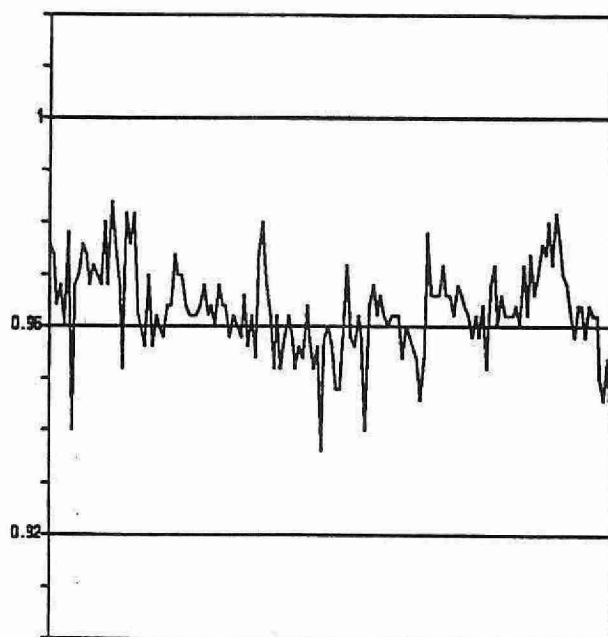
QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89



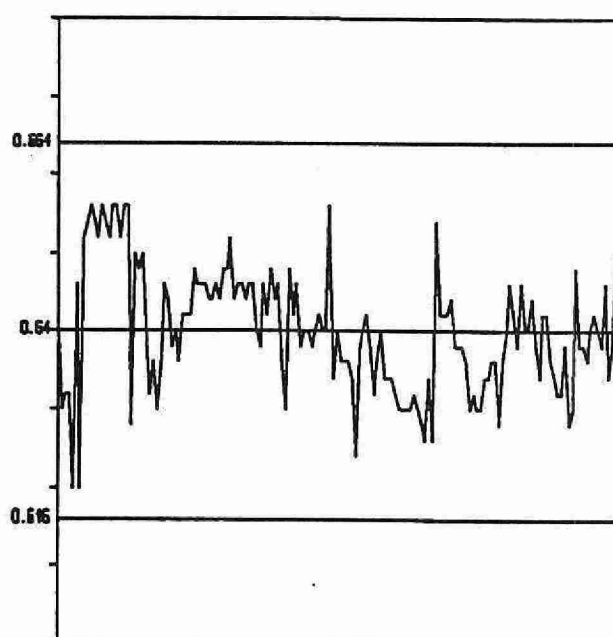
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/77
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 103AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.7 at the full scale level.

Reactive orthophosphate, nitrogen-nitrite and nitrogen-nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus one 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

NITROGEN-AMMONIA+AMMONIUM-SDNP

QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	142	40.0	39.97	-0.03	0.313
b :	142	20.0	20.03	0.03	0.140
a+b :	142	60.0	60.00	0.00	0.380
a-b :	142	20.0	19.94	-0.06	0.302
c :	142	20.0	20.03	-0.03	0.140
d :	142	4.0	4.00	0.00	0.048
c+d :	142	24.0	24.03	-0.03	0.160
c-d :	142	16.0	16.03	0.03	0.134

s.d.(AB) Sw(within run): 0.21 S(between runs): 0.24 S/Sw: 1.14

s.d.(CD) Sw(within run): 0.09 S(between runs): 0.10 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.1	-	24.9	for	C+D
15.4	-	16.6	for	C-D

DUPLICATES:

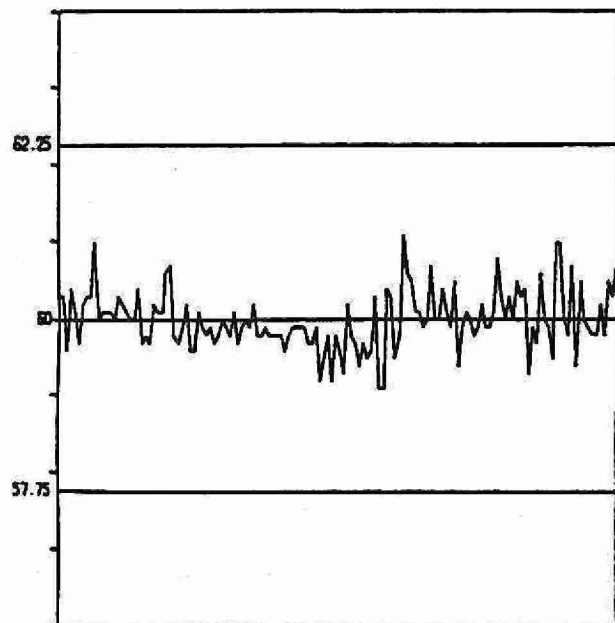
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
175	0.00	-	2.00	0.1203	33.9
18	2.00	-	5.00	0.1372	4.2
34	5.00	-	10.00	0.1408	1.9
39	10.00	-	20.00	0.2766	2.2
15	20.00	-	50.00	0.3639	1.1
281	Overall			0.0922	

OTHER CHECKS:

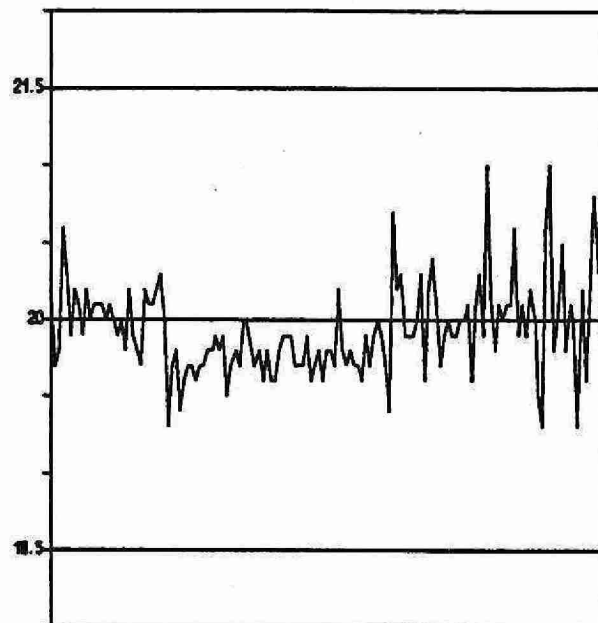
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	142	0.0018	0.021

NITROGEN - AMMONIA PLUS AMMONIUM - SDNP (MG/L AS N)

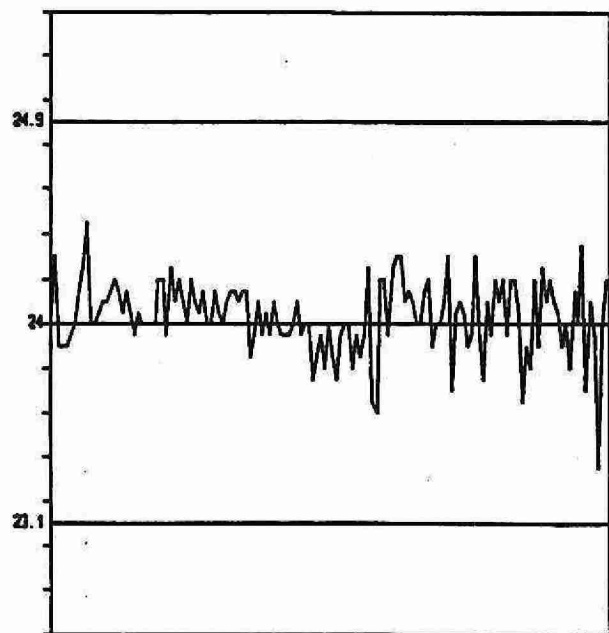
QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89



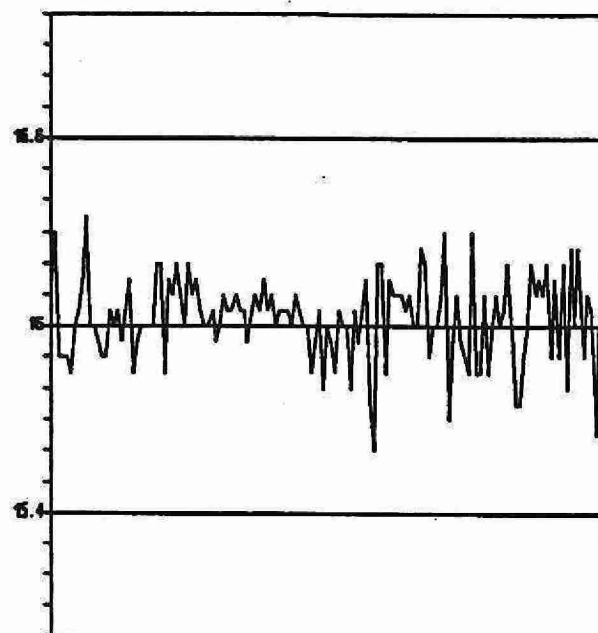
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR, NNHTUR	Units	: mg/L as N
Work Station Code	: PRAM	Unit Code	: 064807
Method Code	: 103CC3, 003CC3	Supervisor	: M. Rawlings
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for dry deposition air filter extracts is also determined at this work station.

Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5cm light path at 630 nm. Data capture, reduction and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.002

T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples, standard every 20 samples

NITROGEN - AMMONIA - PRAM -(NNHTFR)

QUALITY CONTROL DATA FROM 10/02/89 TO 21/12/89

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
a :	125	1.6	1.6073	0.0073	0.015
b :	125	0.8	0.8009	0.0009	0.005
a+b :	125	2.4	2.4082	0.0082	0.017
a-b :	125	0.8	0.8064	0.0064	0.016
c :	125	0.8	0.8009	0.0009	0.005
d :	125	0.16	0.1608	0.0008	0.007
c+d :	125	0.96	0.9617	0.0017	0.010
c-d :	125	0.64	0.6401	0.0001	0.008

s.d.(AB) Sw(within run): 0.01 S(between runs): 0.01 S/Sw: 1.02

s.d.(CD) Sw(within run): 0.006 S(between runs): 0.006 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.616	-	0.664	for	C-D

DUPLICATES:

<u>Number of Data Pairs</u>	<u>Sample Concn Span</u>			<u>Mean(2) s.d.</u>	<u>Coefficient of var.(%)</u>
99	0.00	-	0.20	0.002	4.7
63	0.20	-	0.40	0.003	0.8
106	0.40	-	1.00	0.003	0.7
36	1.00	-	1.50	0.005	0.4
20	1.50	-	2.00	0.006	0.4
324	Overall			0.003	

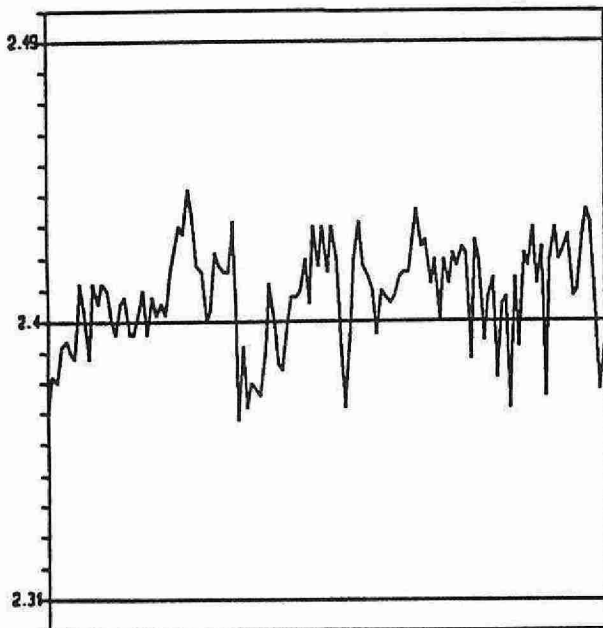
OTHER CHECKS:

	<u>Number of Data</u>	<u>Data Mean</u>	<u>Standard(1) Deviation</u>
Long Term Blank	122	-0.0003	0.0026

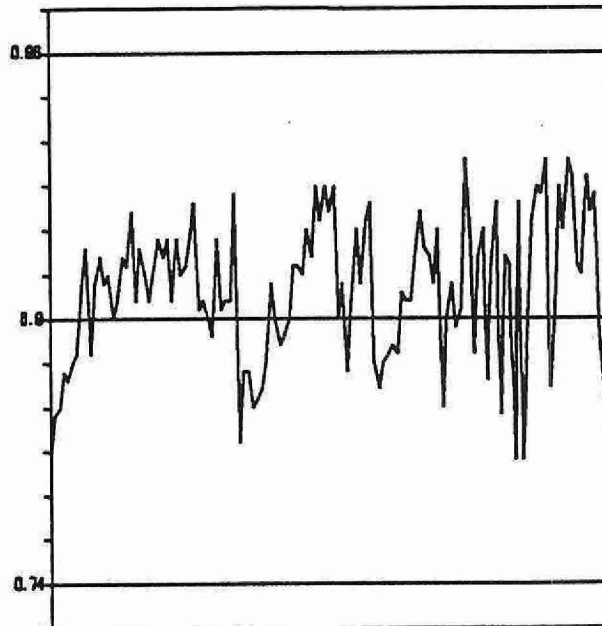
NITROGEN - AMMONIA - PRAM (MG/L AS N)

(NNHTFR)

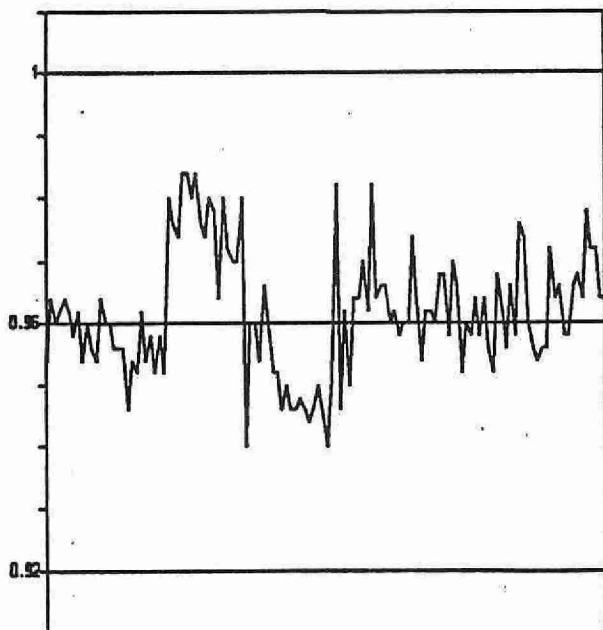
QUALITY CONTROL DATA FROM 10/02/89 TO 21/12/89



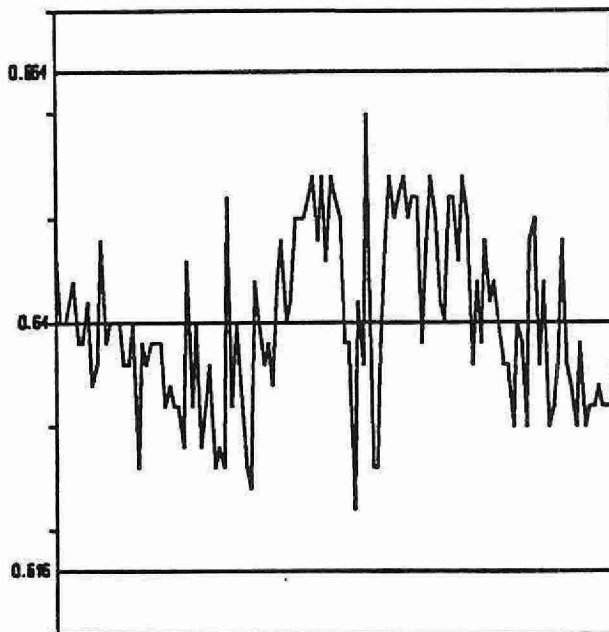
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

NITROGEN - AMMONIA - PRAM - (NNHTFR)

QUALITY CONTROL DATA FROM 14/02/89 TO 21/12/89

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	123	1.6	1.60780	0.00780	0.0150
b :	123	0.8	0.80089	0.00089	0.0054
a+b :	123	2.4	2.40870	0.00870	0.0162
a-b :	123	0.8	0.80691	0.00691	0.0157
c :	123	0.8	0.80089	0.00089	0.0054
d :	123	0.16	0.16086	0.00086	0.0075
c+d :	123	0.96	0.96176	0.00176	0.0100
c-d :	123	0.64	0.64003	0.00003	0.0083

s.d.(AB) Sw(within run): 0.01 S(between runs): 0.01 S/Sw: 1.0

s.d.(CD) Sw(within run): 0.006 S(between runs): 0.006 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.616	-	0.664	for	C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
96	0.00	-	0.20	0.0026	4.60
63	0.20	-	0.40	0.0026	0.85
106	0.40	-	1.00	0.0032	0.69
37	1.00	-	1.50	0.0048	0.39
20	1.50	-	2.00	0.0066	0.46
322	Overall			0.0032	

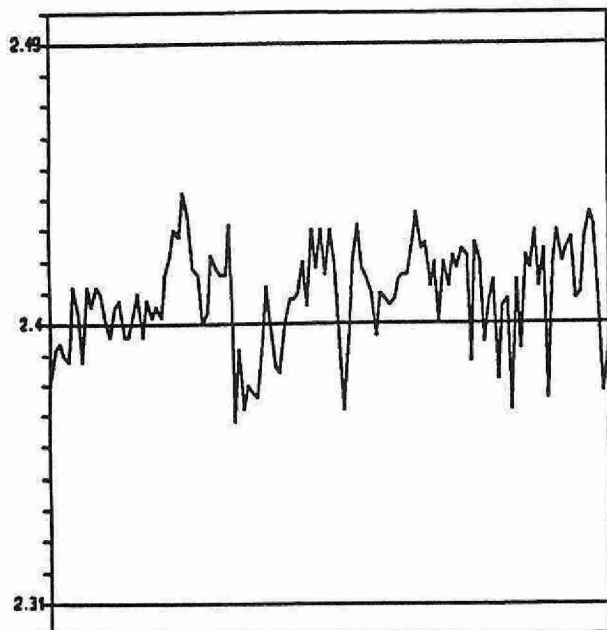
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	120	0.0003	0.0026

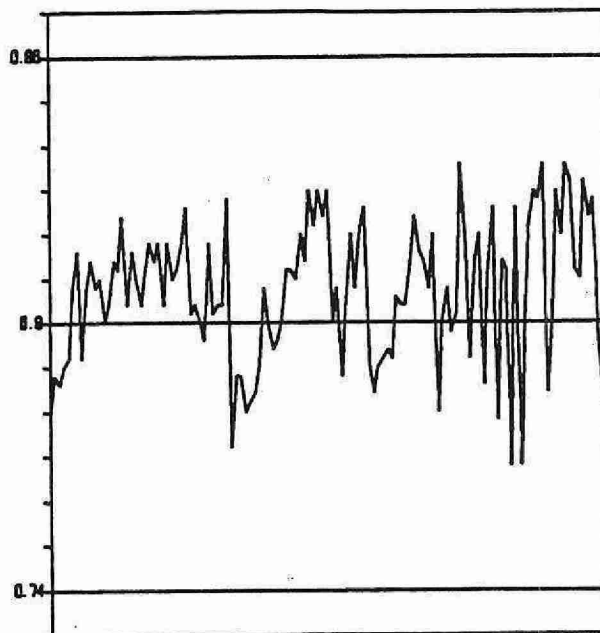
NITROGEN - AMMONIA - PRAM (MG/L AS N)

(NNHTUR)

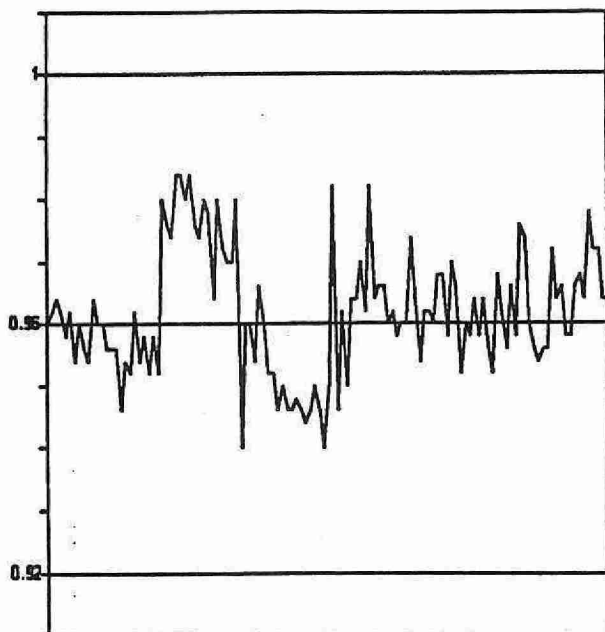
QUALITY CONTROL DATA FROM 14/02/89 TO 21/12/89



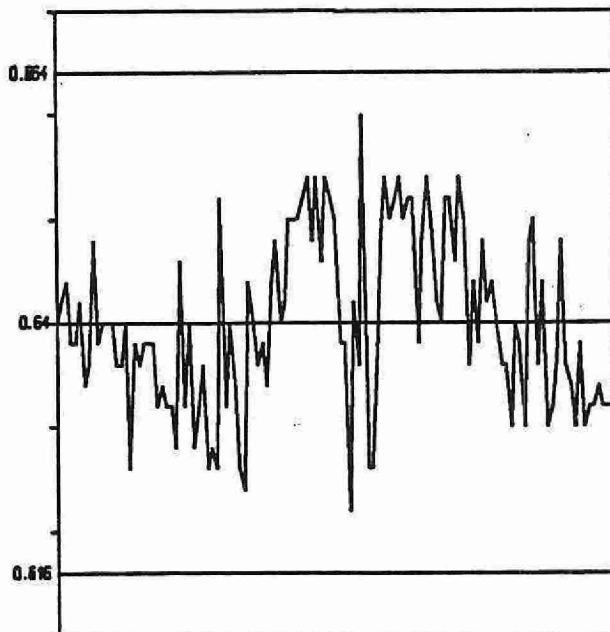
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** NITROGEN - NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3FR,NNRICF	Units	: ug/Filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Nylon (NNRICF) filter from LoVol and sequential filter packs, and Teflon (NN03FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as N. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN - NITRATE - PRSEQ - (NNO3FR)

QUALITY CONTROL DATA FROM 12/01/89 TO 28/12/89

Lab: Ion Chromatography

Analytical Range: - to 50 ug/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	123	40.0	39.9	-0.1	0.49
b :	123	10.0	9.9	-0.1	0.72
a+b :	123	50.0	49.8	-0.2	0.89
a-b :	123	30.0	30.0	-0.0	0.85

s.d.(AB) Sw(within run): 0.60 S(between runs): 0.61 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 - 52.2 for A+B
28.5 - 31.5 for A-B

DUPLICATES:

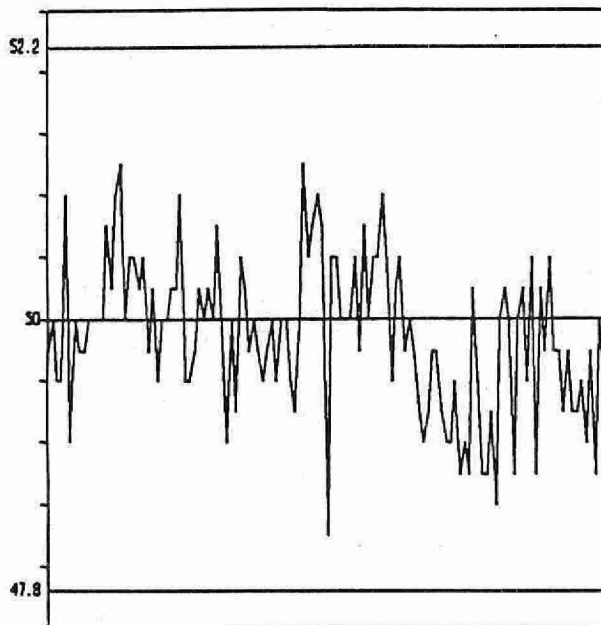
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
188	0.0 - 5.0	0.108	5.8
56	5.0 - 10.0	0.176	2.4
61	10.0 - 25.0	0.190	1.6
14	25.0 - 50.0	0.439	1.4
319	Overall	0.133	

OTHER CHECKS:

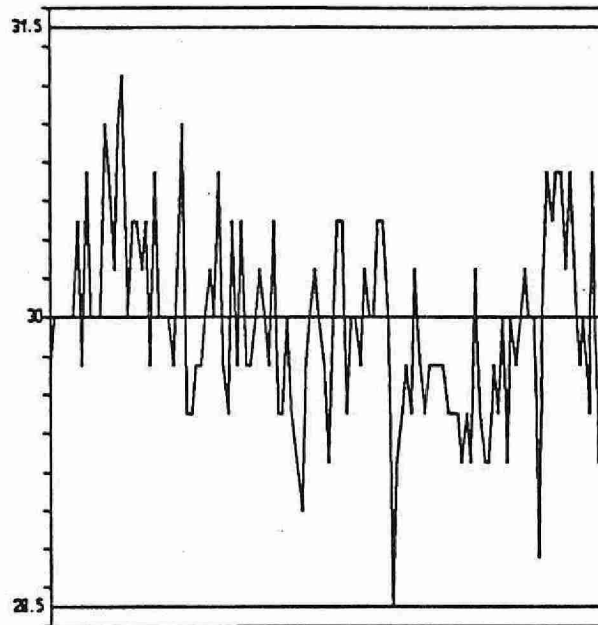
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	123	0.0203	0.0882

NITROGEN - NITRATE - PRSEQ-(NNO3FR) (UG/FILTER AS N)

QUALITY CONTROL DATA FROM 12/01/89 TO 28/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

NITROGEN - NITRATE - PRSEQ - (NNRICF)

QUALITY CONTROL DATA FROM 12/01/89 TO 21/12/89

Lab: Ion Chromatography

Analytical Range: - to 50 ug/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	104	40.0	39.8	-0.2	0.44
b :	104	10.0	9.9	-0.1	0.26
a+b :	104	50.0	49.7	-0.3	0.58
a-b :	104	30.0	29.9	-0.1	0.43

s.d.(AB) Sw(within run): 0.30 S(between runs): 0.33 S/Sw: 1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 - 52.2 for A+B
28.5 - 31.5 for A-B

DUPLICATES:

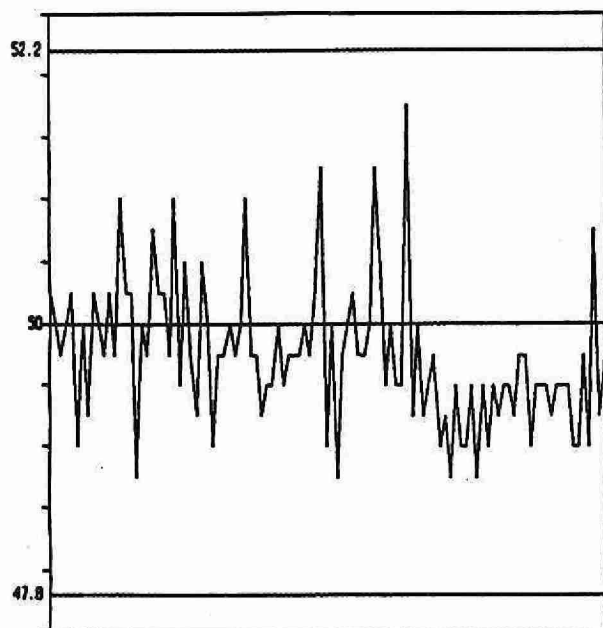
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
45	0.0	-	1.5	0.126	18.6
61	1.5	-	5.0	0.169	5.4
82	5.0	-	25.0	0.199	2.3
4	25.0	-	50.0	0.335	1.2
192	Overall			0.174	

OTHER CHECKS:

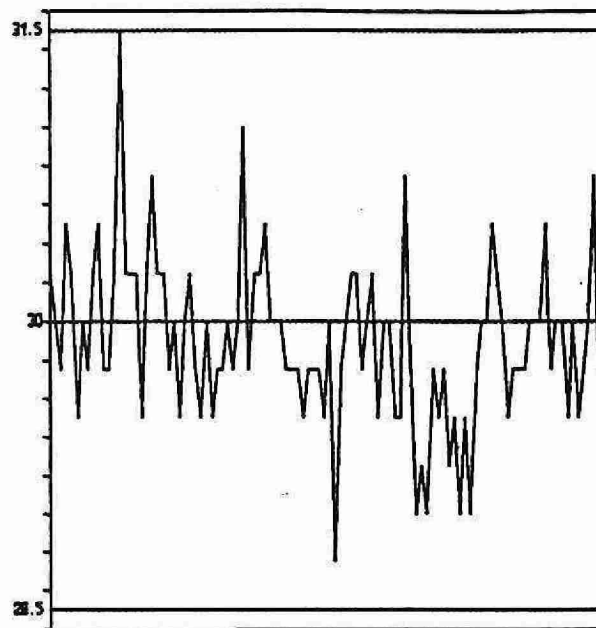
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	104	0.091	0.327

NITROGEN - NITRATE - PRSEQ-(NNRICF) (UG/FILTER AS N)

QUALITY CONTROL DATA FROM 12/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** NITROGEN - NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO3UR	Units	: mg/L as N
Work Station Code	: PRIC1	Unit Code	: 064807
Method Code	: 003AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene bottle

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

NITROGEN - NITRATE - PRIC1

QUALITY CONTROL DATA FROM 05/01/89 TO 14/12/89

Lab: Ion Chromatography

Analytical Range: - to 2 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	107	1.600	1.6001	0.0001	0.0245
b :	107	0.400	0.4039	0.0039	0.0165
a+b :	107	2.000	2.0040	0.0040	0.0366
a-b :	107	1.200	1.1962	-0.0038	0.0200

s.d.(AB) Sw(within run): 0.014 S(between runs): 0.021 S/Sw: 1.47

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91 - 2.09 for A+B
1.16 - 1.24 for A-B

DUPLICATES:

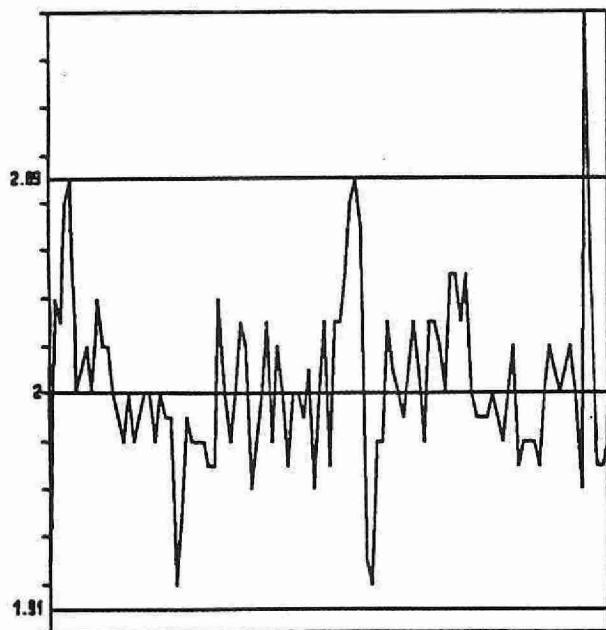
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
147	0.00 - 0.20	0.0082	11.8
49	0.20 - 0.50	0.0083	3.4
45	0.50 - 1.00	0.0096	1.8
16	1.00 - 2.00	0.0273	2.1
257	Overall	0.0080	3.8

OTHER CHECKS:

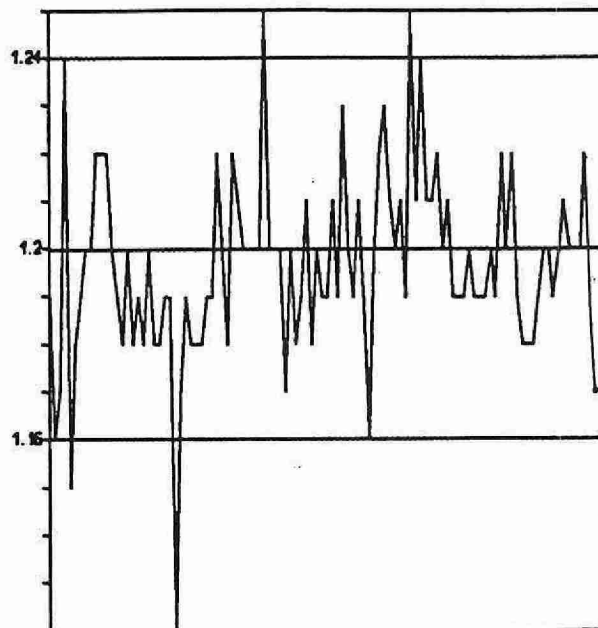
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	90	0.0151	0.0144

NITROGEN - NITRATE - PRIC1 (MG/L AS N)

QUALITY CONTROL DATA FROM 05/01/89 TO 14/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** NITROGEN - NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3UR	Units	: ug/Filter as N
Work Station Code	: PRLOV	Unit Code	: 361807
Method Code	: 004AIC	Supervisor	: F. Lo
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as N. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN - NITRATE - PRLOV

QUALITY CONTROL DATA FROM 17/01/89 TO 21/12/89

Lab: Ion Chromatography

Analytical Range: - to 100 ug/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	31	80.0	79.7	- 0.3	0.92
b :	31	20.0	19.9	- 0.1	0.48
a+b :	31	100.0	99.6	-0.4	1.16
a-b :	31	60.0	59.8	-0.2	0.90

s.d.(AB) Sw(within run): 0.63 S(between runs): 0.73 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.5 - 104.5 for A+B
57.0 - 63.0 for A-B

DUPLICATES:

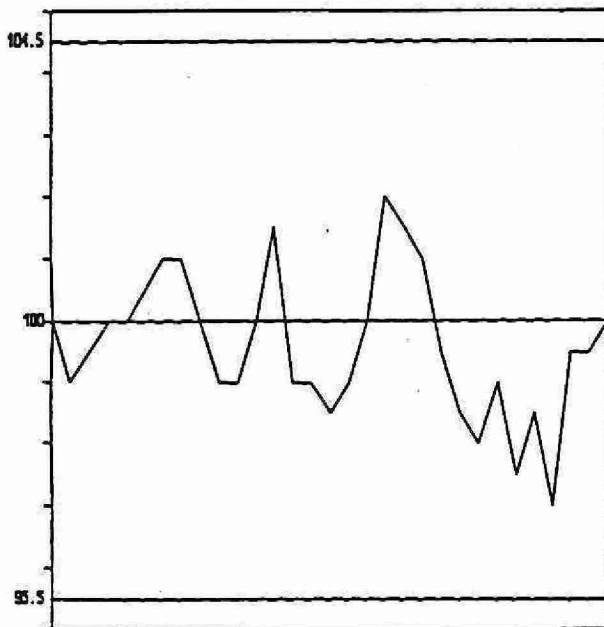
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
14	0.0	-	10.0	0.27	8.4
13	10.0	-	25.0	0.29	1.8
5	25.0	-	50.0	0.43	1.6
6	50.0	-	100.0	1.18	1.5
38	Overall			0.38	

OTHER CHECKS:

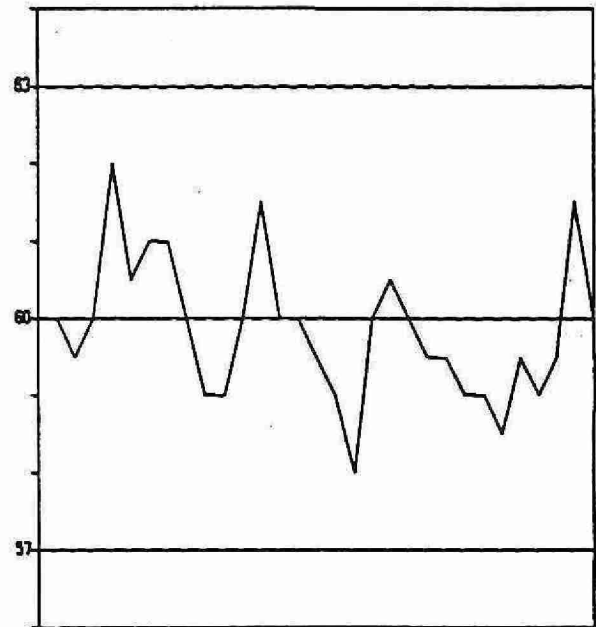
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	31	0.032	0.124

NITROGEN - NITRATE - PRLOV (UG/FILTER AS N)

QUALITY CONTROL DATA FROM 17/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 13/06/78
LIS Test Name Code	: NNOTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1525C2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: PET 500 mL Jar

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a sample. Nitrate is reduced to nitrite in alkaline media at 37°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl)ethylenediaminedihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.
Approximate absorbance : 0.4 at the full scale level.
Ammonia plus ammonium is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 2

T value: 10

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration:	LTBL plus 4 QC standards, e.g. QCA
Drift:	BL every 10 samples and BL plus check standard every 20 samples.

NITRATE + NITRITE - DONUT

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89

Lab: Dorset

Analytical Range: - to 500 ug/l as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	92	375.0	374.5	0.5	6.47
b :	92	125.0	124.4	0.6	2.88
a+b :	92	500.0	498.9	1.1	8.64
a-b :	92	250.0	250.1	-0.1	5.08

s.d.(AB) Sw(within run): 3.59 S(between runs): 5.01 S/Sw: 1.39

On any given day the calibration is accepted if the values obtained lie within the ranges:

470 - 530 for A+B
230 - 270 for A-B

DUPLICATES:

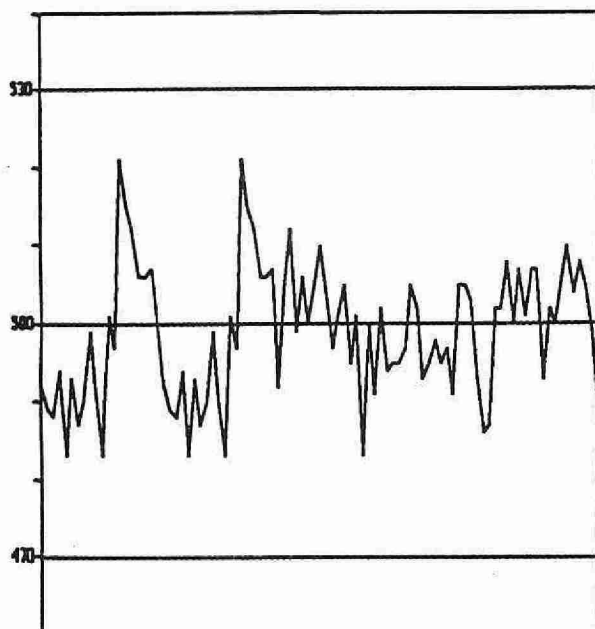
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
95	0.0 - 50.0	1.28	9.6
50	50.0 - 100.0	4.20	5.3
73	100.0 - 250.0	5.42	7.8
31	100. - 500.0	7.69	7.5
249	Overall	3.89	

OTHER CHECKS:

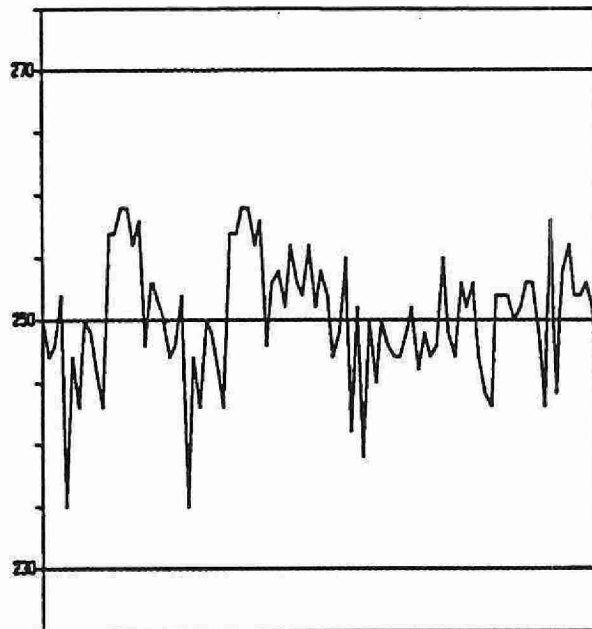
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	92	0.72	1.189
Absorbance	92	162.83	12.012

NITRATE + NITRITE - DONUT (UG/L AS N)

QUALITY CONTROL DATA FROM 04/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***NITROGEN - NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.6 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.005

T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN-NITRATE PLUS NITRITE-RNDNP

QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 5.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	154	4.0	4.01	0.01	0.033
b :	154	2.0	2.01	0.01	0.019
a+b :	154	6.0	6.02	0.02	0.042
a-b :	154	2.0	2.00	0.00	0.033
c :	154	2.0	2.01	0.01	0.019
d :	154	0.4	0.41	0.01	0.010
c+d :	154	2.4	2.41	0.01	0.025
c-d :	154	1.6	1.61	0.01	0.017

s.d.(AB) Sw(within run): 0.02 S(between runs): 0.03 S/Sw: 1.13

s.d.(CD) Sw(within run): 0.012 S(between runs): 0.015 S/Sw: 1.23

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77	-	6.23	for	A+B
1.85	-	2.15	for	A-B
2.30	-	2.50	for	C+D
1.54	-	1.66	for	C-D

DUPLICATES:

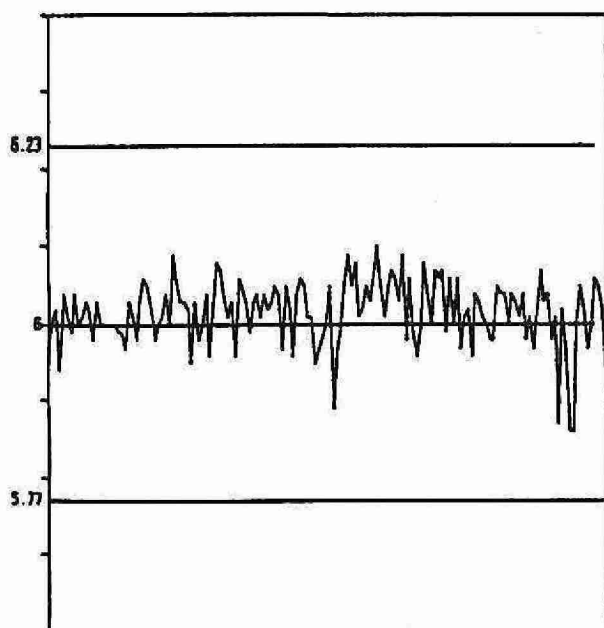
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
158	0.00 - 0.20	0.0095	33.6
127	0.20 - 0.50	0.0136	6.6
41	0.50 - 1.00	0.0177	3.5
32	1.00 - 2.50	0.0231	2.0
59	2.50 - 5.00	0.0419	1.6
417	Overall	0.0167	

OTHER CHECKS:

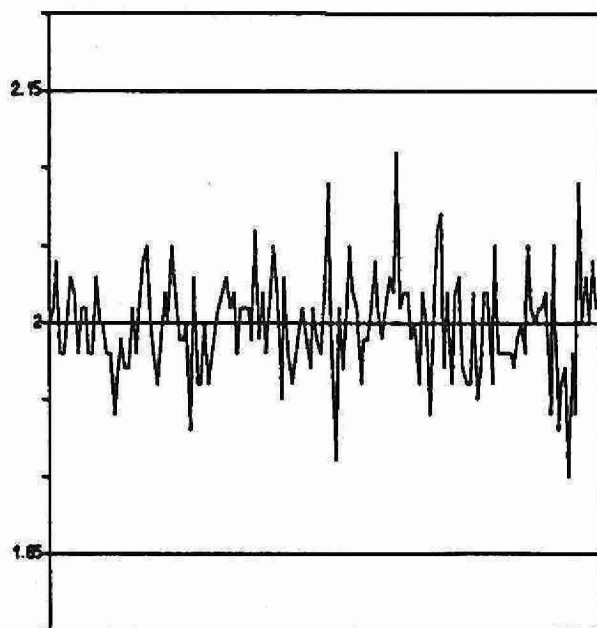
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	136	0.003	0.005

NITROGEN - NITRATE PLUS NITRITE - RNDNP (MG/L AS N)

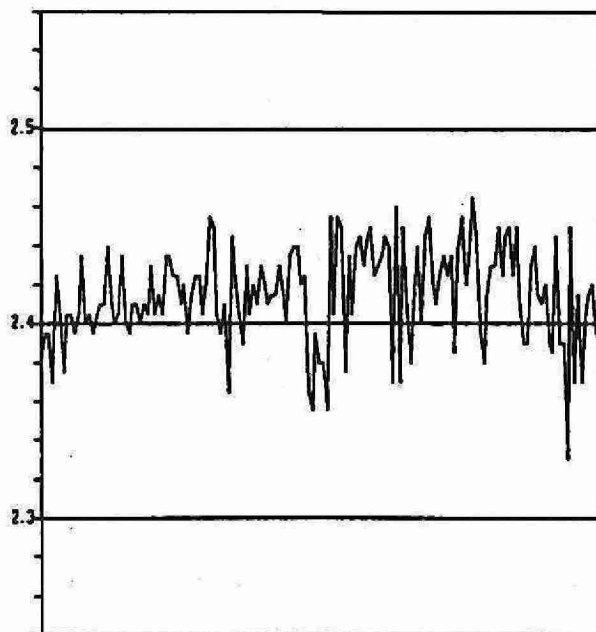
QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89



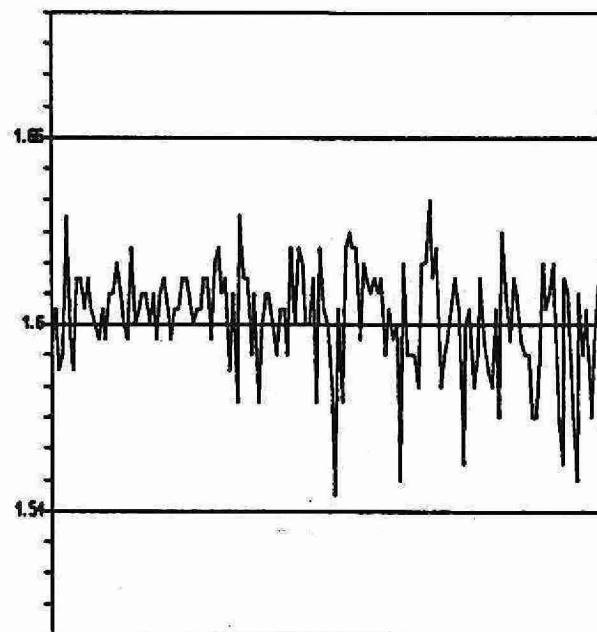
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step. Approximate absorbance: 0.7 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive phosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Two analytical ranges are obtained from the output of the colourimeter. Data capture, reduction, and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN-NITRATE+NITRITE-SDNP

QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	142	40.0	39.94	-0.06	0.282
b :	142	20.0	20.07	0.07	0.162
a+b :	142	60.0	60.02	0.02	0.364
a-b :	142	20.0	19.87	-0.13	0.282
c :	142	20.0	20.07	0.07	0.162
d :	142	4.0	4.03	0.03	0.051
c+d :	142	24.0	24.11	0.11	0.183
c-d :	142	16.0	16.04	0.04	0.155

s.d.(AB) Sw(within run): 0.20 S(between runs): 0.23 S/Sw: 1.15

s.d.(CD) Sw(within run): 0.11 S(between runs): 0.12 S/Sw: 1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

58.2	-	61.8	for	A+B
18.8	-	21.2	for	A-B
23.14	-	24.86	for	C+D
15.42	-	16.58	for	C-D

DUPLICATES:

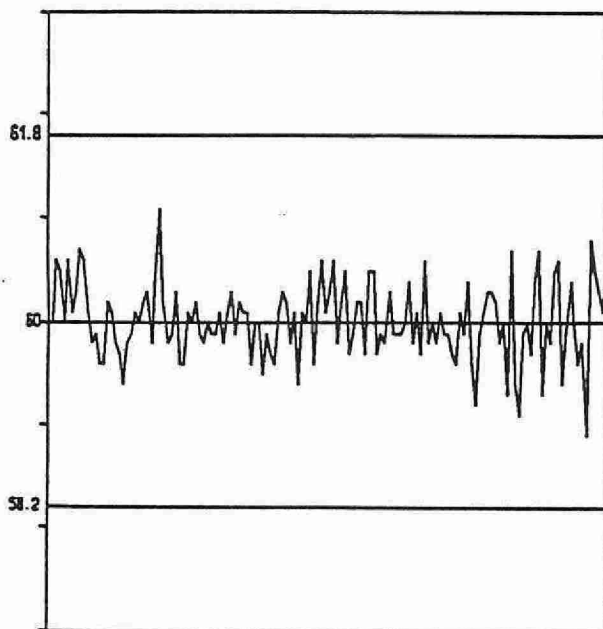
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
239	0.00	-	2.00	0.033	10.8
50	2.00	-	5.00	0.075	8.2
41	5.00	-	10.00	0.114	2.5
66	10.00	-	20.00	0.149	1.2
21	20.00	-	50.00	0.326	1.5
417	Overall			0.066	

OTHER CHECKS:

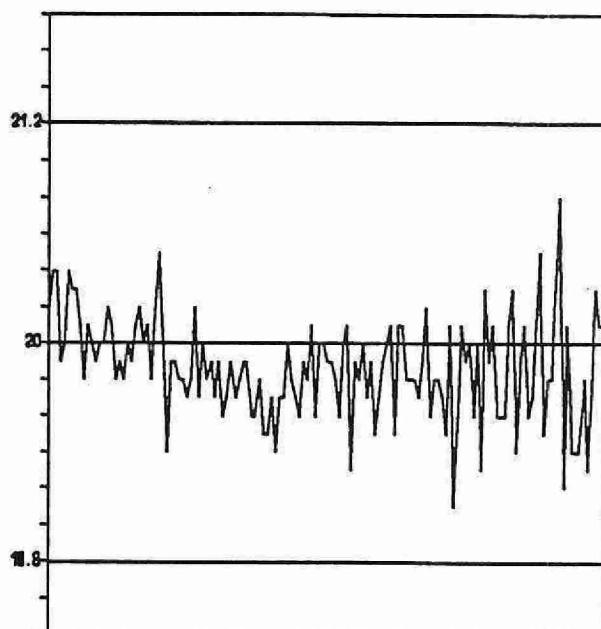
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	137	-0.001	0.028

NITROGEN - NITRATE PLUS NITRITE - SDNP (MG/L AS N)

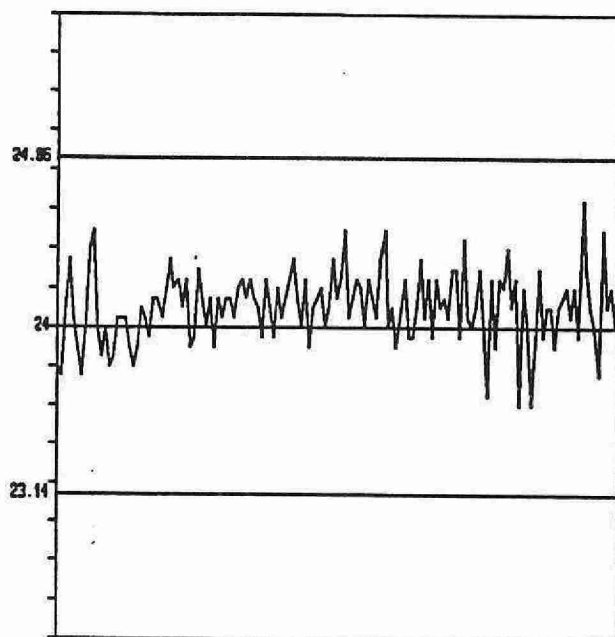
QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89



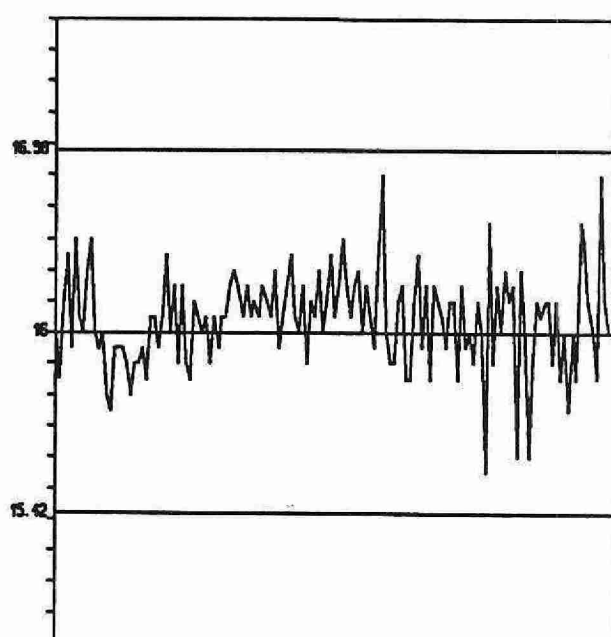
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/76
LIS Test Name Code	: NNOTUR	Units	: mg/L as N
Work Station Code	: WFNO3	Unit Code	: 064807
Method Code	: 002CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Ministry of Health Water Samples		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step. Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITRATE + NITRITE - WFNO3

QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	114	16.0	16.002	0.002	0.253
b :	114	8.0	8.072	0.072	0.129
a+b :	114	24.0	24.075	0.075	0.350
a-b :	114	8.0	7.931	-0.069	0.198
c :	114	8.0	8.072	0.072	0.129
d :	114	1.6	1.604	0.004	0.061
c+d :	114	9.6	9.675	0.075	0.141
c-d :	114	6.4	6.468	0.068	0.145

s.d.(AB) Sw(within run): 0.14 S(between runs): 0.20 S/Sw: 1.43

s.d.(CD) Sw(within run): 0.10 S(between runs): 0.10 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.0	-	25.0	for	A+B
7.3	-	8.7	for	A-B
9.15	-	10.05	for	C+D
5.95	-	6.85	for	C-D

DUPLICATES:

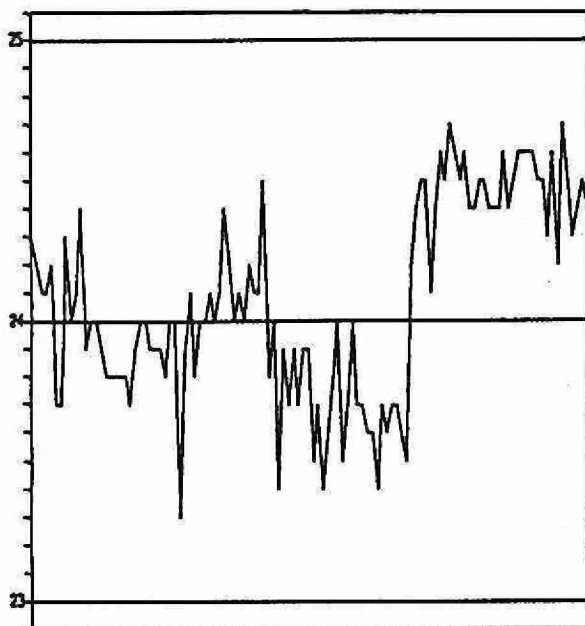
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
258	0.00	-	2.00	0.086	26.61
35	2.00	-	5.00	0.089	2.76
18	5.00	-	10.00	0.125	1.53
11	10.00	-	20.00	0.198	1.24
322	Overall			0.092	

OTHER CHECKS:

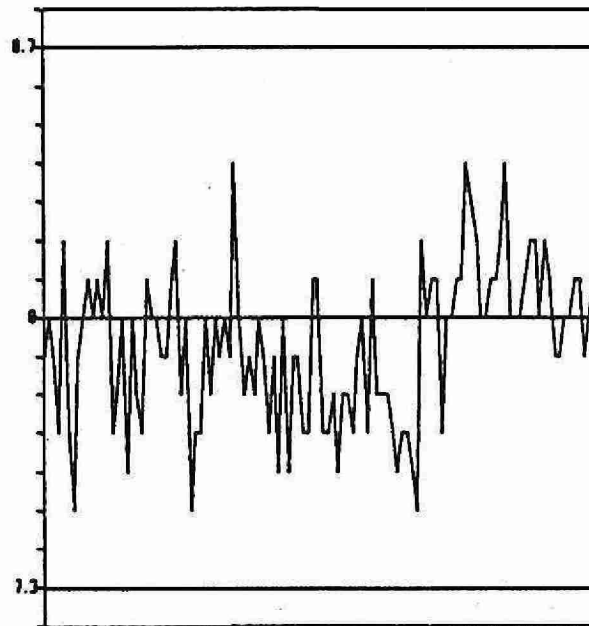
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	113	0.007	0.068

NITRATE PLUS NITRITE - WFNO_3 (MG/L AS N)

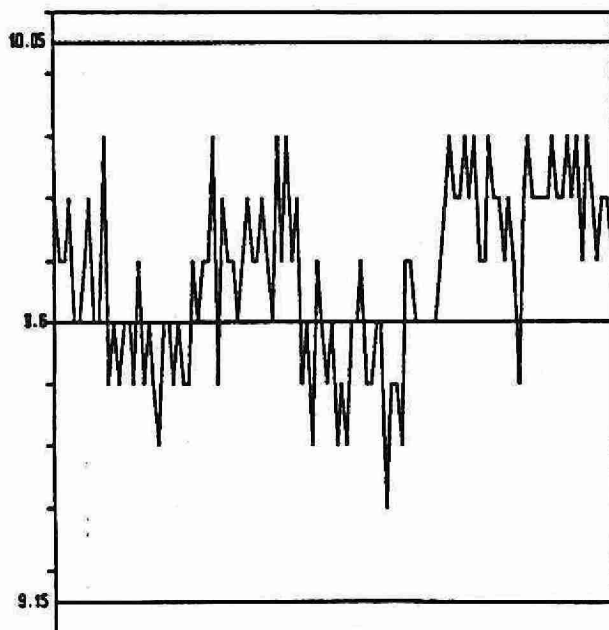
QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89



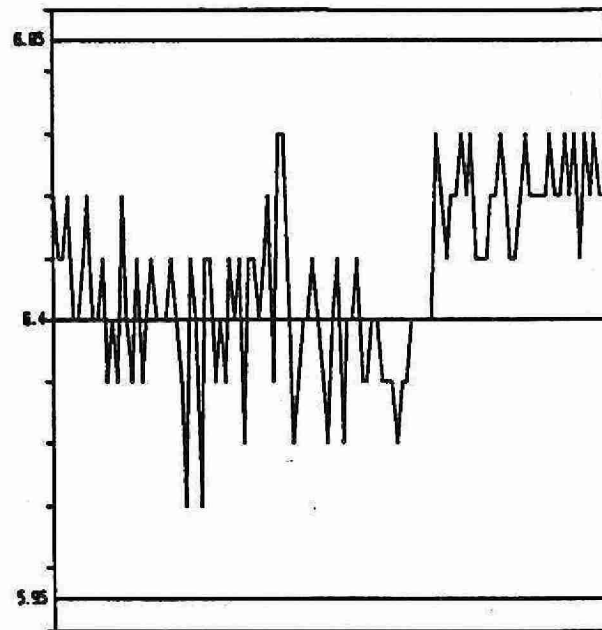
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** NITROGEN - NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.6 at the full scale level.

Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.001

T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN-NITRITE-RNDNP

QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 0.200 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	150	0.16	0.158	-0.002	0.0012
b :	150	0.08	0.080	0.000	0.0008
a+b :	150	0.24	0.238	-0.002	0.0016
a-b :	150	0.08	0.078	-0.002	0.0012
c :	150	0.08	0.080	0.000	0.0008
d :	150	0.016	0.0162	0.0002	0.0006
c+d :	150	0.096	0.0962	0.0002	0.0012
c-d :	150	0.064	0.0638	-0.0002	0.0008

s.d.(AB) Sw(within run): 0.0009 S(between runs): 0.0010 S/Sw: 1.15

s.d.(CD) Sw(within run): 0.0006 S(between runs): 0.0007 S/Sw: 1.26

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231	-	0.249	for	A+B
0.074	-	0.086	for	A-B
0.092	-	0.100	for	C+D
0.061	-	0.067	for	C-D

DUPLICATES:

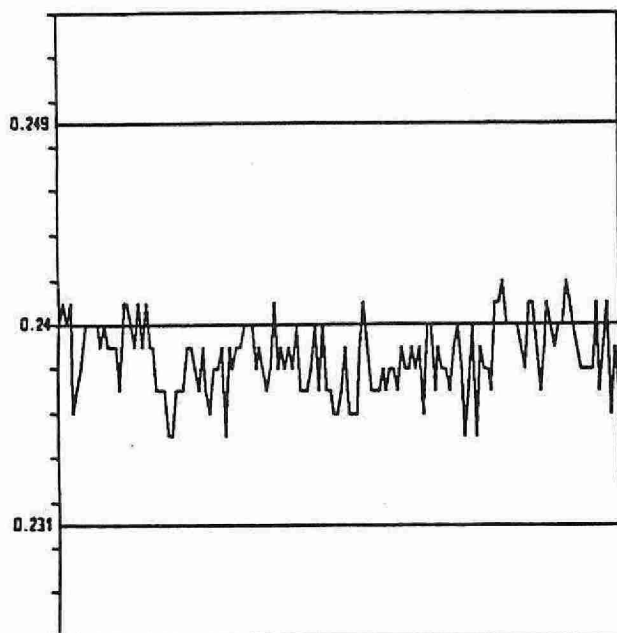
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
200	0.000	- 0.005	0.0011	40.2
121	0.005	- 0.020	0.0013	13.3
87	0.020	- 0.200	0.0018	3.8
408	Overall		0.0013	

OTHER CHECKS:

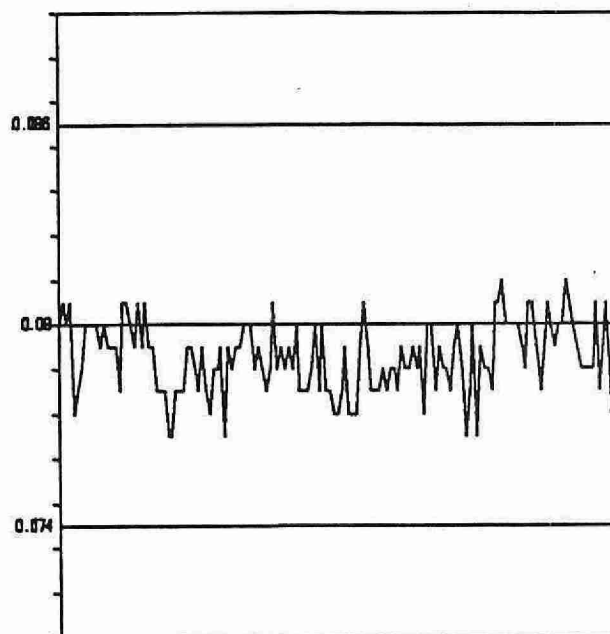
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	136	0.0001	0.00061

NITROGEN - NITRITE - RNDNP (MG/L AS N)

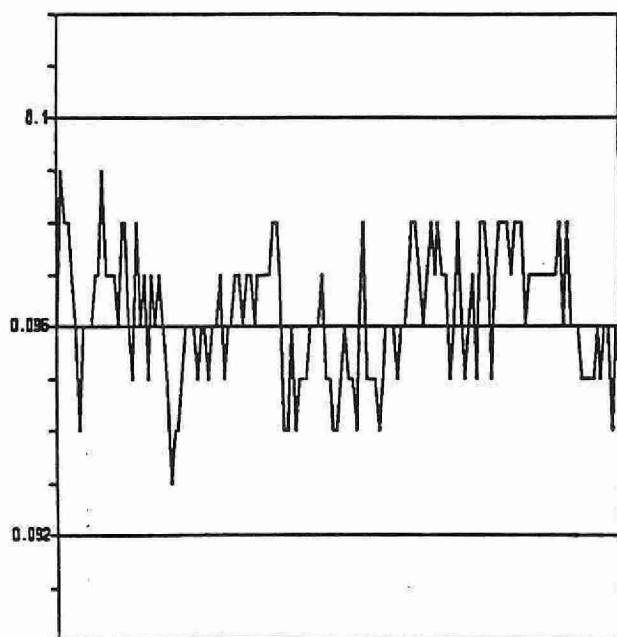
QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89



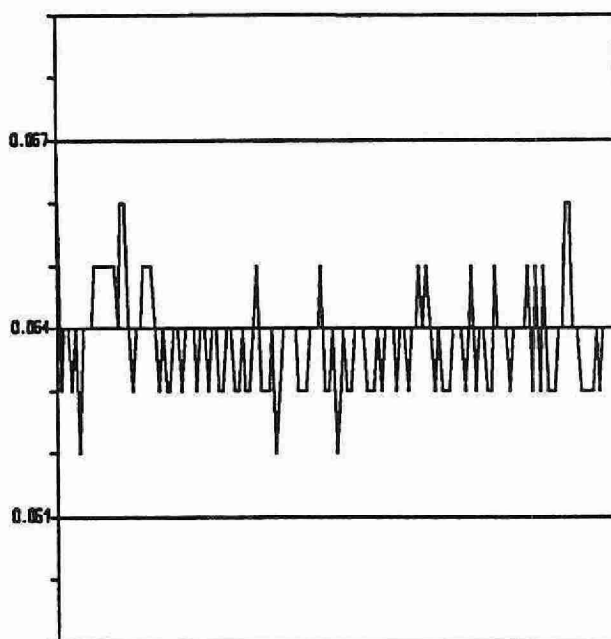
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** NITROGEN - NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.3 at the full scale level.

Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.005

T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN-NITRITE-SDNP

QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	142	1.6	1.597	-0.003	0.0116
b :	142	0.8	0.800	0.000	0.0064
a+b :	142	2.4	2.397	-0.003	0.0144
a-b :	142	0.8	0.798	-0.002	0.0121
c :	142	0.8	0.800	0.000	0.0064
d :	142	0.16	0.160	0.000	0.0040
c+d :	142	0.96	0.960	0.000	0.0090
c-d :	142	0.64	0.640	0.000	0.0056

s.d.(AB) Sw(within run): 0.008 S(between runs): 0.009 S/Sw: 1.10

s.d.(CD) Sw(within run): 0.004 S(between runs): 0.005 S/Sw: 1.34

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.61	-	0.67	for	C-D

DUPLICATES:

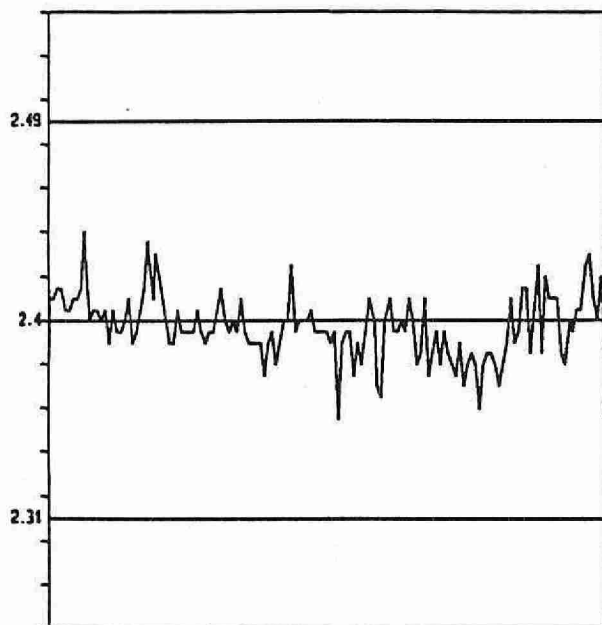
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
318	0.00	-	0.20	0.003	22.0
84	0.20	-	1.00	0.012	4.9
12	1.00	-	2.00	0.041	2.7
414	Overall			0.004	

OTHER CHECKS:

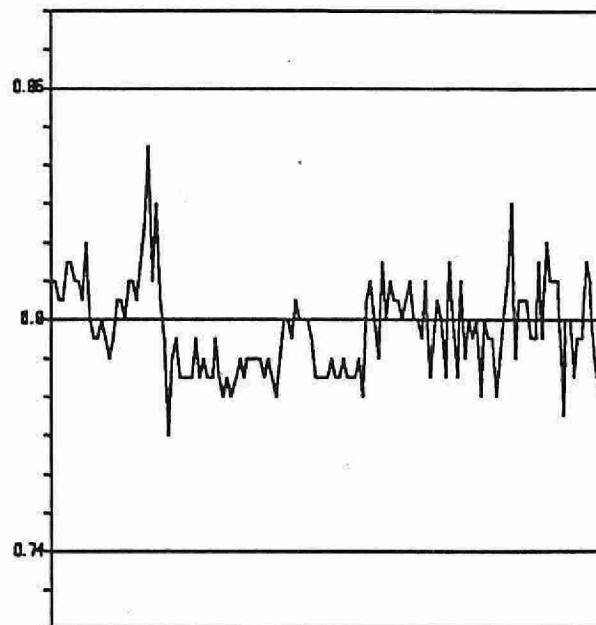
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	142	0.0004	0.0027

NITROGEN - NITRITE - SDNP (MG/L AS N)

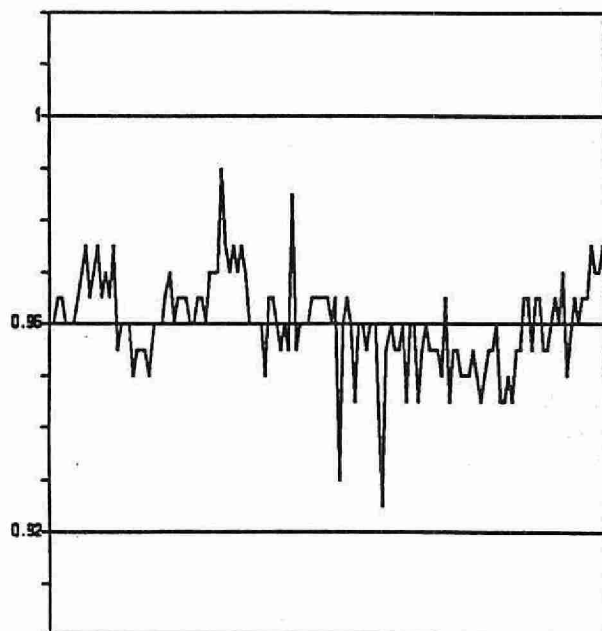
QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89



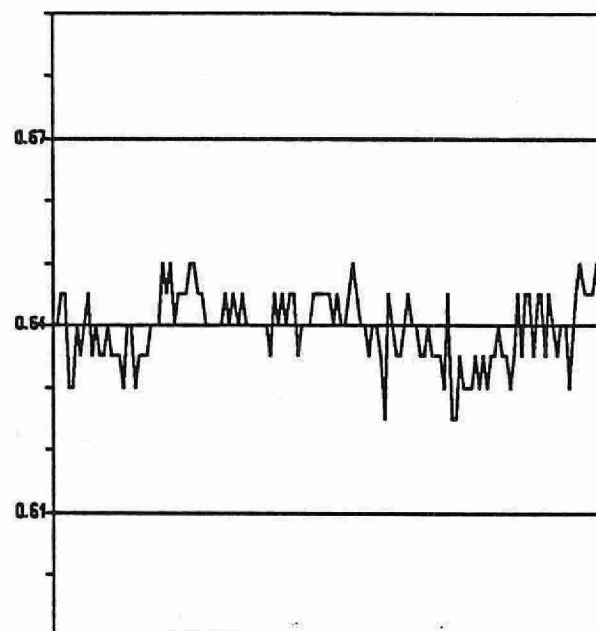
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

***** NITROGEN - TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: RTNP	Unit Code	: 064807
Method Code	: 004AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.
Approximate absorbance: 0.3 at the full scale level.
Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters
Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay). Coulourimetric measurement is through a 5.0 cm. light path at 630 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration	: LTBL plus 3 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

NITROGEN-TOTAL KJELDAHL-RTNP

QUALITY CONTROL DATA FROM 04/01/89 TO 29/12/89

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
a :	179	1.6	1.597	0.003	0.0155
b :	179	0.8	0.800	0.000	0.0092
a+b :	179	2.4	2.397	0.003	0.0206
a-b :	179	0.8	0.797	0.003	0.0150
c :	179	0.8	0.800	0.000	0.0092
d :	179	0.16	0.161	-0.001	0.0074
c+d :	179	0.96	0.961	-0.001	0.0118
c-d :	179	0.64	0.639	0.001	0.0117

s.d.(AB) Sw(within run): 0.011 S(between runs): 0.013 S/Sw: 1.20

s.d.(CD) Sw(within run): 0.008 S(between runs): 0.008 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.616	-	0.664	for	C-D

RECOVERIES:

	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Standard(1) Deviation</u>
R1 :	179	1.40	1.397	0.0350
R2 :	178	0.84	0.834	0.0243
R3 :	179	0.28	0.279	0.0151

DUPLICATES:

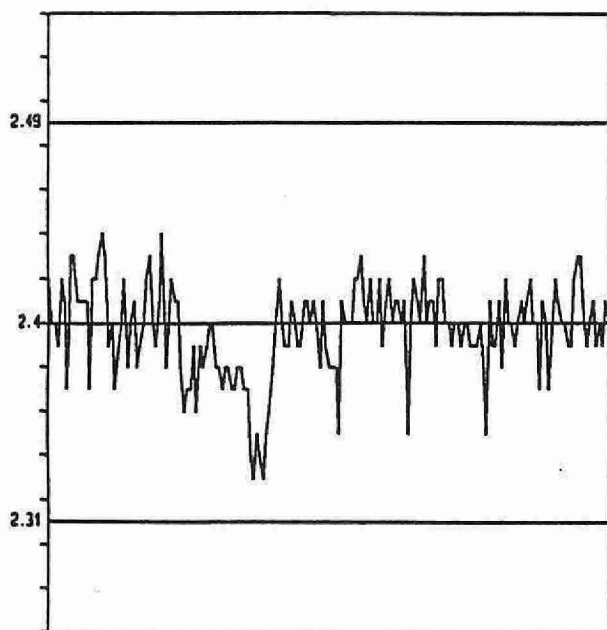
<u>Number of Data Pairs</u>	<u>Sample Concn Span</u>		<u>Mean(2) s.d.</u>	<u>Coefficient of var.(%)</u>
123	0.00	- 0.20	0.0173	15.2
289	0.20	- 0.50	0.0177	5.6
87	0.50	- 1.00	0.0269	3.9
12	1.00	- 2.00	0.0326	2.4
511	Overall		0.0194	

OTHER CHECKS:

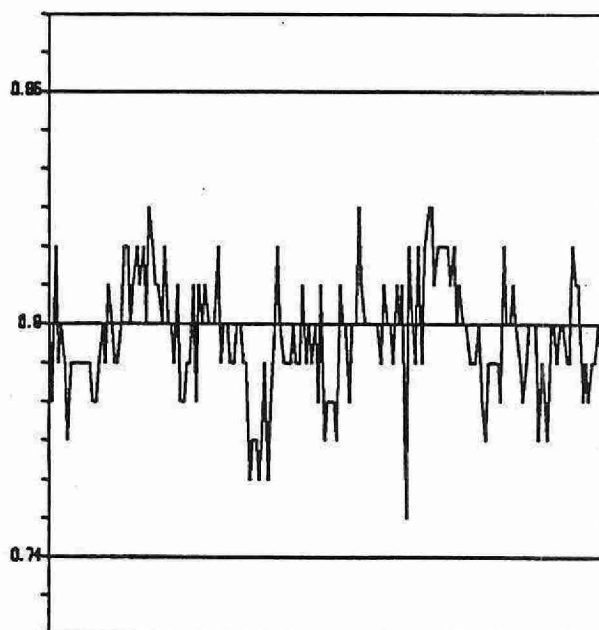
	<u>Number of Data</u>	<u>Data Mean</u>	<u>Standard(1) Deviation</u>
Long Term Blank	171	-0.003	0.0072
Digested Blank	179	0.018	0.0165

NITROGEN - TOTAL KJEDAHL - RTNP (MG/L AS N)

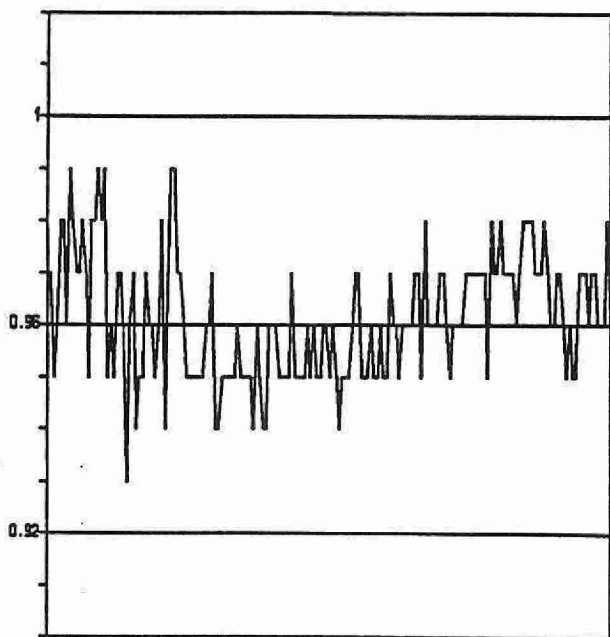
QUALITY CONTROL DATA FROM 04/01/89 TO 29/12/89



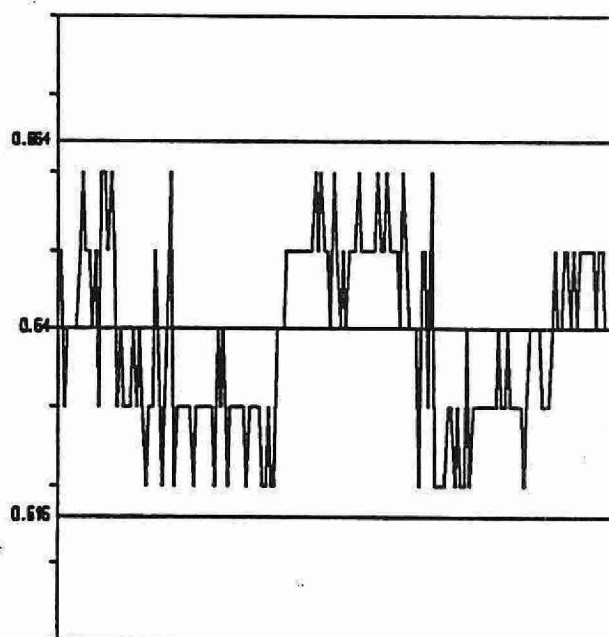
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** NITROGEN - TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: STKNP	Unit Code	: 064807
Method Code	: 004BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Effluents, Leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.
Approximate absorbance: 1.1 at the full scale level.
Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters
Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay). Coulourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration : LTBL plus 3 undigested standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; undigested standard every 20 samples

MODIFICATIONS:

02/02/89 -Full scale changed from 25 to 50 mg/L as N. Calibration standards 0, 10, 20, 40, 60, 80, 100 % automatically adjusted. Calibration controls, and recoveries adjusted accordingly.

NOTES:

**System is calibrated with undigested standards. Minimum sample dilution is 50% (i.e. factor of two). Therefore actual W and T values are twice that listed.

NITROGEN-TOTAL KJELDAHL-STKNP

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	161	40.0	39.92	-0.08	0.163
b :	161	20.0	19.98	-0.02	0.010
a+b :	161	60.0	59.91	-0.09	0.216
a-b :	161	20.0	19.93	-0.07	0.161
c :	161	20.0	19.99	-0.01	0.010
d :	161	4.0	4.01	0.01	0.041
c+d :	161	24.0	24.00	0.00	0.117
c-d :	161	16.0	15.98	-0.02	0.097

s.d.(AB) Sw(within run): 0.11 S(between runs): 0.13 S/Sw: 1.18

s.d.(CD) Sw(within run): 0.07 S(between runs): 0.08 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.1	-	24.9	for	C+D
15.4	-	16.6	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	161	35.0	34.66	0.375
R2 :	161	21.0	20.79	0.233
R3 :	161	7.0	6.97	0.098

DUPLICATES:

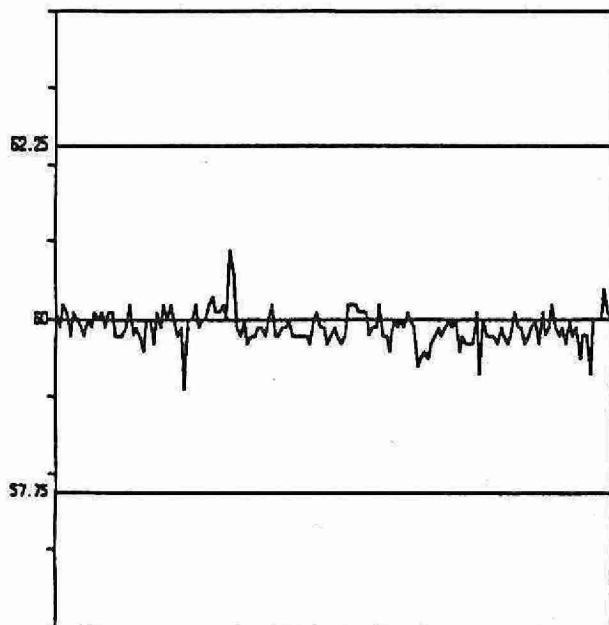
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
152	0.00	-	0.50	0.0436	19.9
168	0.50	-	2.00	0.0887	8.9
86	2.00	-	10.00	0.2064	1.5
75	10.00	-	50.00	0.2592	0.3
481	Overall			0.1060	

OTHER CHECKS:

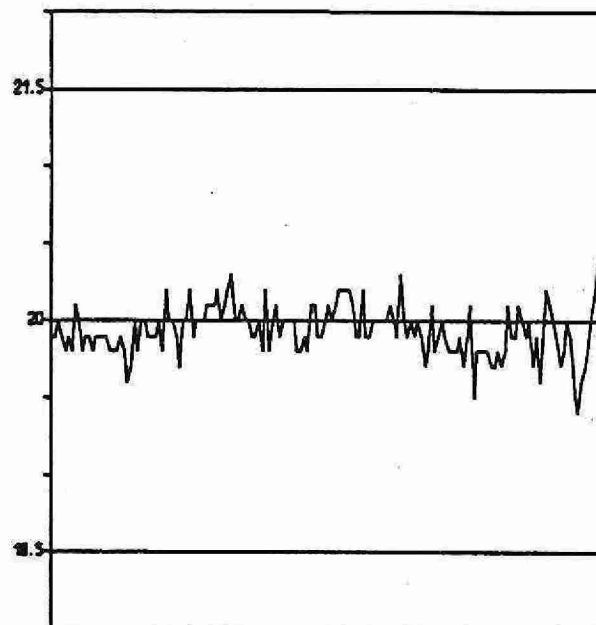
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	161	-0.0003	0.020
Digested Blank	161	0.0273	0.052

NITROGEN - TOTAL KJELDAHL - STKNP (MG/L AS N)

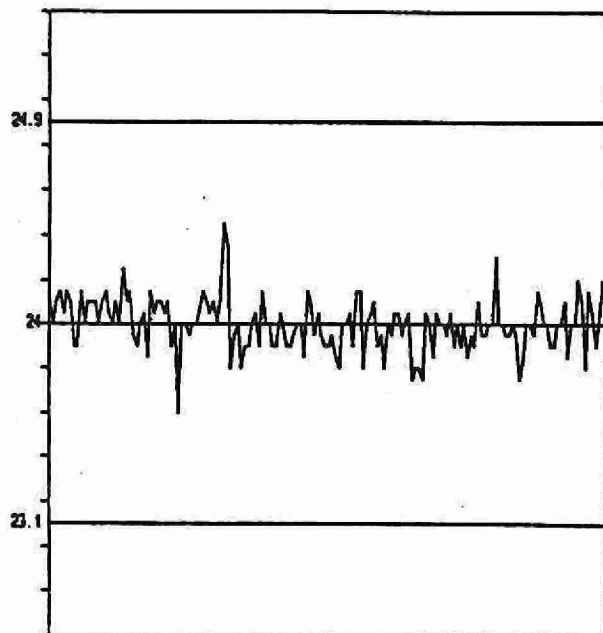
QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89



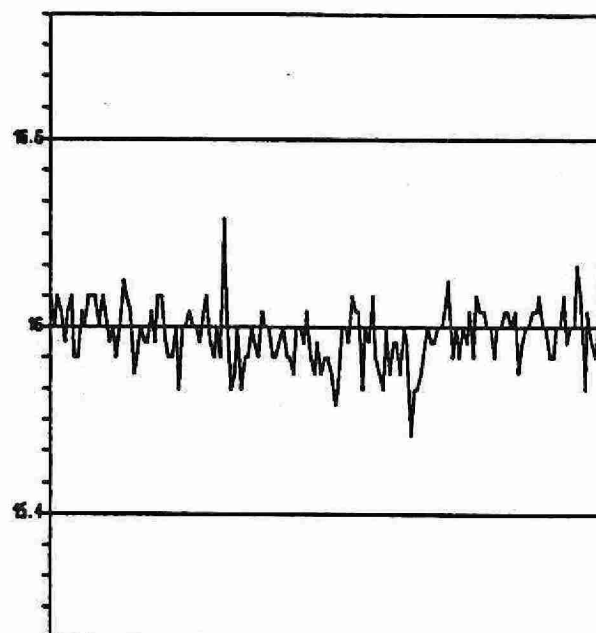
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** OXYGEN DEMAND - BIOCHEMICAL ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '61
LIS Test Name Code	: BOD5	Units	: mg/L as O
Work Station Code	: SBBOD5	Unit Code	: 064808
Method Code	: 001AI2	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required	: 400 mL
Container	: Glass or plastic

SAMPLE PREPARATION:

If necessary sample pH is adjusted to neutral and chlorine is removed by reaction with sodium sulphite.

ANALYTICAL PROCEDURE:

Oxygen depletion is measured as the difference in dissolved oxygen (DO) concentration. DO readings are taken prior to sample storage, and also at the end of storage in the dark at 20°C for five days (BOD5). If necessary, dilutions are made with aerated, nutrient-enriched water to obtain a 25-75% oxygen depletion. If the sample has undergone any of the sample preparation steps listed above or if the sample is an industrial waste, a sewage seed is added. For such samples, calculation of an appropriate seed correction is required.

INSTRUMENTATION:

- Weston and Stack Oxygen analyzer with DO probe equipped with stirrer and fitted with a Teflon membrane of 0.5 mil thickness which is permeable to oxygen.
- Titration equipment for Winkler analysis of dissolved oxygen.
- Incubator (19-21°C); BOD bottles (300 mL)

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION (DO):

Blank is a sulphite solution (negligible DO) and the standard is air-saturated distilled, deionized water. The DO content of the latter is read from a table after measuring its temperature and the barometric pressure in the laboratory.

CONTROLS:

Calibration (DO)	: 2 QC solutions of distilled water which have been partially stripped of DO by flushing with nitrogen. These "solutions", of different but unknown DO, are analyzed with the Oxygen Analyzer and by the Winkler titration procedure. The difference between the values for the two analytical methods is utilized as a slope control for the DO Analyzer.
Recovery (BOD5)	: 3 Recovery standards prepared from a combination of Glucose and Glutamic Acid e.g. R1; the expected BOD5 is 67% of the oxygen requirement for complete oxidation.
Drift	: Air saturated distilled water after every 24 samples.
Blanks	: Distilled deionized water and BOD dilution water

NOTES:

Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.

OXYGEN DEMAND - BIOCHEMICAL - SBBOD5

QUALITY CONTROL DATA FROM 05/01/89 TO 29/12/89

Lab: Solids and BOD

Analytical Range: - to 400.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	95	0.00	0.05	0.05	0.09
b :	95	0.00	0.05	0.05	0.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

-0.25 - 0.25

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	56	2.20	2.24	0.08
R2 :	55	4.34	4.41	0.21
R3 :	54	6.52	6.52	0.30

DUPLICATES:

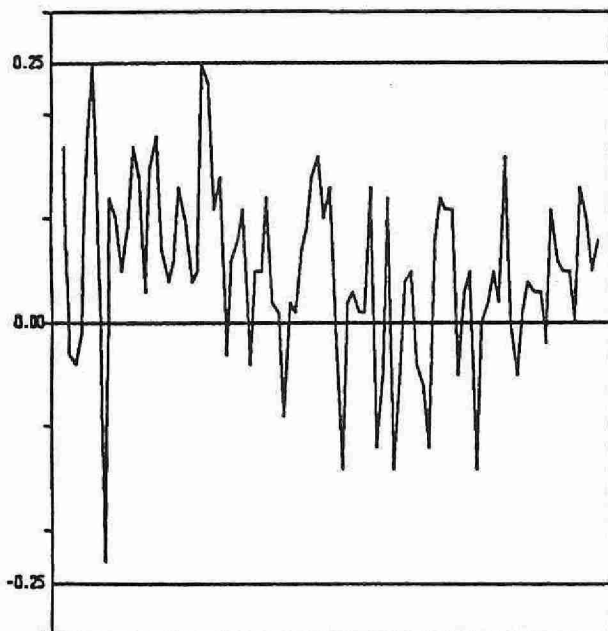
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
92	0	-	5	0.09	7.16
20	5	-	20	0.20	2.81
9	20	-	50	0.59	3.32
10	50	-	100	3.21	4.97
25	100	-	400	4.34	2.86
156	Overall			1.75	

OTHER CHECKS:

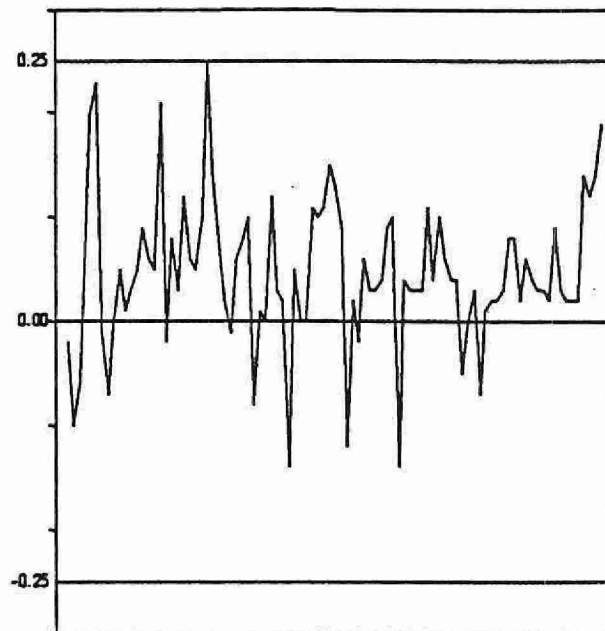
	Number of Data	Data Mean	Standard(1) Deviation
5 Day DDW Blank	56	0.20	0.13
5 Day BOD Blank	56	0.19	0.10

OXYGEN DEMAND - BIOCHEMICAL - SBBOD5 (MG/L AS O)

QUALITY CONTROL DATA FROM 05/01/89 TO 29/12/89



QUALITY CONTROL SAMPLE A



QUALITY CONTROL SAMPLE B

***** OXYGEN DEMAND - CHEMICAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: RCOD	Unit Code	: 064808
Method Code	: 5251C2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required : 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150 C. Analysis is completed by automated colourimetric measurement of trivalent chromium.
Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

-Culture tubes with Teflon closures; mechanical-convection oven
-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

3 digested BL plus 3 digested standards

CONTROLS:

Calibration : 2 digested standards, e.g. QCA
Recovery : 2 digested standards, e.g. R1
Drift : Undigested BL every 10 samples; standard plus BL at end of run
Interference : Digested standard (40 mg/L as O) spiked with 50 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week.

OXYGEN DEMAND - CHEMICAL - RCOD

QUALITY CONTROL DATA FROM 06/01/89 TO 18/12/89

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	31	40.0	39.7	-0.3	0.98
b :	31	10.0	9.9	-0.1	1.18
a+b :	31	50.0	49.7	-0.3	1.93
a-b :	31	30.0	29.8	-0.2	0.98

s.d.(AB) Sw(within run): 0.70 S(between runs): 1.08 S/Sw: 1.55

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.0	-	53.0	for	A+B
28.8	-	31.2	for	A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	29	39.0	33.3	3.99
R2 :	29	9.8	8.1	3.24

DUPLICATES:

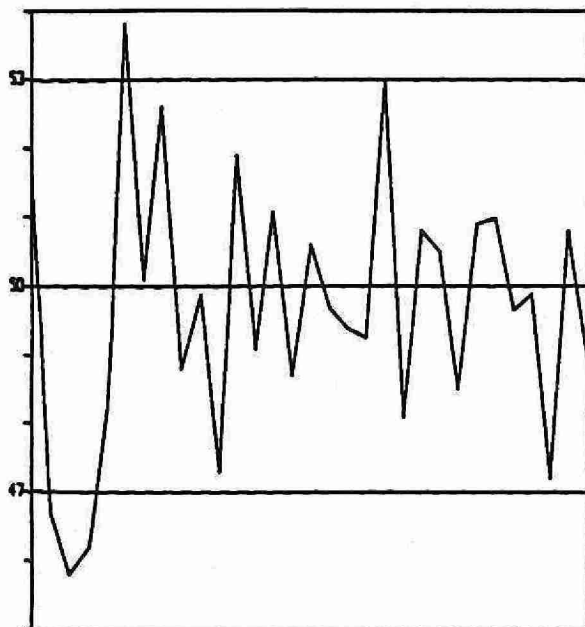
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.0 - 5.0	1.42	55.5
55	5.0 - 20.0	1.65	15.2
16	20.0 - 50.0	1.19	9.4
77	Overall	1.56	

OTHER CHECKS:

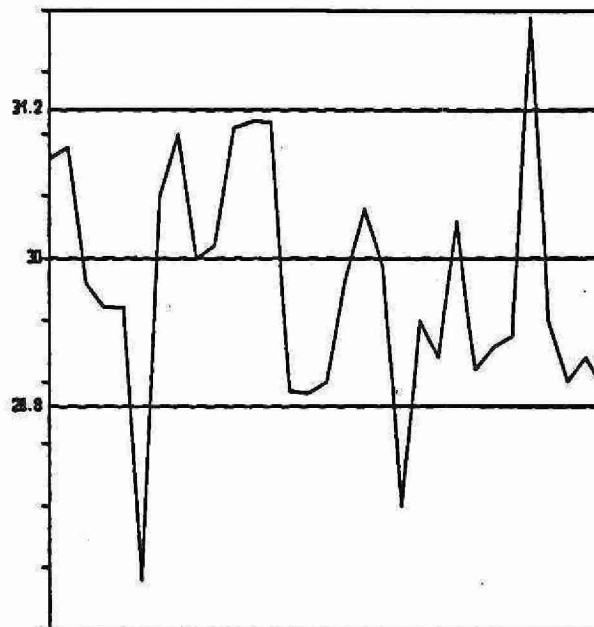
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	24	35.1	6.8

OXYGEN DEMAND - CHEMICAL - RCOD (MG/L AS O)

QUALITY CONTROL DATA FROM 06/01/89 TO 18/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** OXYGEN DEMAND - CHEMICAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: SBCOD	Unit Code	: 064808
Method Code	: 002AC0	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150°C. Analysis is completed by automated colourimetric measurement of trivalent chromium.

Approximate absorbance: 0.6 at the full scale level.

INSTRUMENTATION:

-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 2

T value: 10

CALIBRATION:

2 digested BL plus 4 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (50 mg/L as O) spiked to 900 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week. The recovery standard is a material known to be very difficult to digest. The expected recovery is approximately 85%, based on long term experience. We continue to use this material in spite of the poor recovery, because if the slightest problem exists with the digestion step, the recovery falls off sharply to approximately 10%.

OXYGEN DEMAND - CHEMICAL - SBCOD

QUALITY CONTROL DATA FROM 11/01/89 TO 15/12/89

Lab: Colourimetry

Analytical Range: - to 500.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	40	400	392.5	-7.5	6.28
b :	40	100	99.3	-0.7	4.37
a+b :	40	500	491.8	-8.2	9.03
a-b :	40	300	293.2	-6.8	5.97

s.d.(AB) Sw(within run): 4.22 S(between runs): 5.41 S/Sw: 1.30

On any given day the calibration is accepted if the values obtained lie within the ranges:

477.5 - 522.5 for A+B
285.0 - 315.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	40	390	375.9	9.42
R2 :	40	98	94.1	5.83

DUPLICATES:

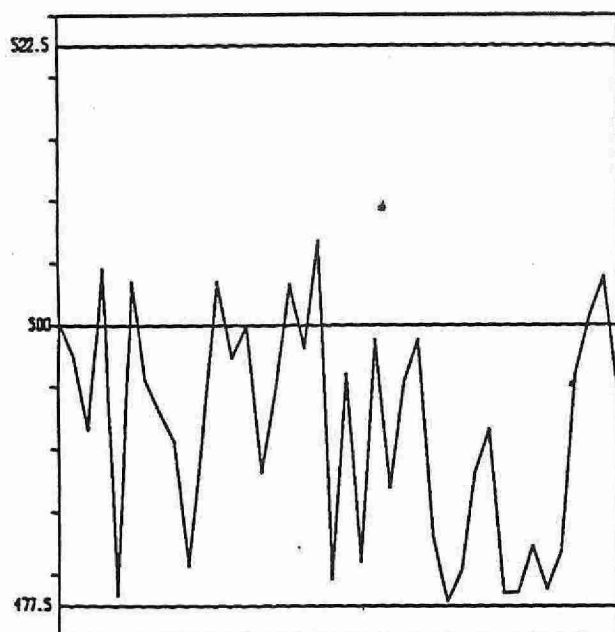
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
23	0 - 5	3.40	66.0
48	5 - 25	3.96	30.0
33	25 - 100	4.91	10.5
8	100 - 250	11.28	6.4
0	250 - 500	N.A.	N.A.
112	Overall	4.79	

OTHER CHECKS:

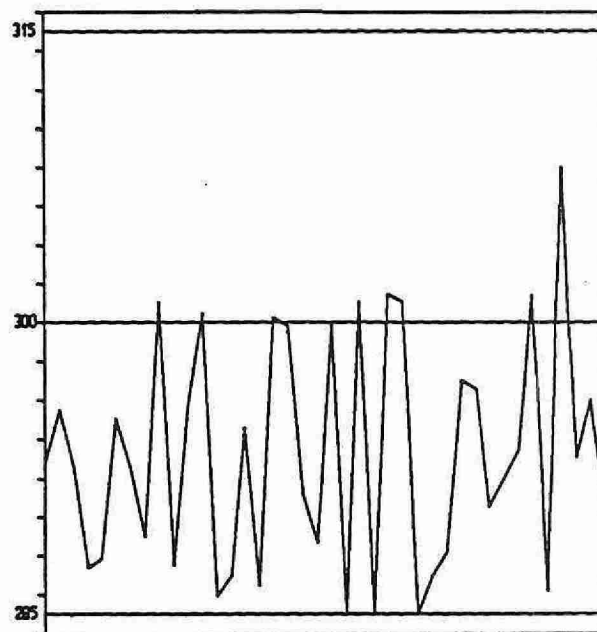
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	34	54.6	6.85

OXYGEN DEMAND - CHEMICAL - SBCOD (MG/L AS O)

QUALITY CONTROL DATA FROM 11/01/89 TO 15/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** pH *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: pH	Units	: dimensionless
Work Station Code	: DOCOP	Unit Code	: nil
Method Code	: 0903PH	Supervisor	: A. Neary
Sample Type/Matrix	: Lakes		

SAMPLING:

Quantity Required: 100 mL
Container: BOD bottle filled to the brim; screw caps with cone-shaped liners.

ANALYTICAL PROCEDURE:

pH is measured directly on a stirred sample (50 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: BL plus 2 standards, e.g. QCA, QCB
Drift: 2 standard buffers - 2 times daily

pH - DOCOP

QUALITY CONTROL DATA FROM 04/01/89 TO 21/12/89

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	218	6.86	6.86	0.00	0.016
b :	218	4.00	4.01	-0.01	0.063
a+b :	218	10.86	10.87	-0.01	0.068
a-b :	218	2.86	2.86	0.00	0.061

s.d.(AB) Sw(within run): 0.043 S(between runs): 0.046 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

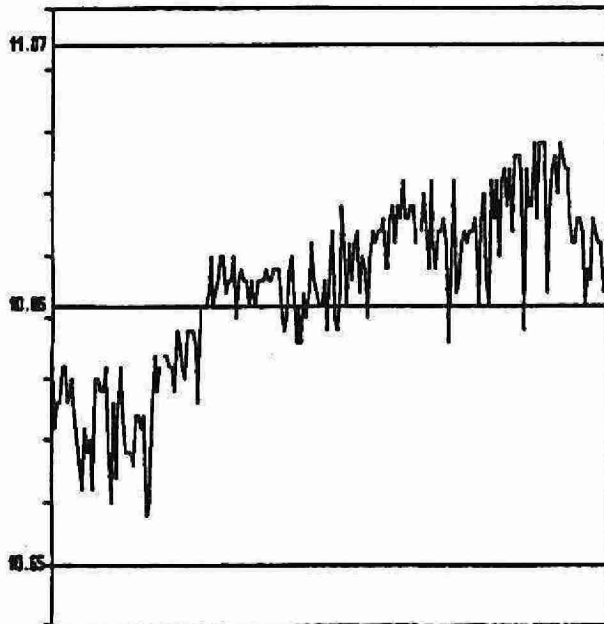
10.65 - 11.07 for A+B
2.72 - 3.00 for A-B

DUPLICATES:

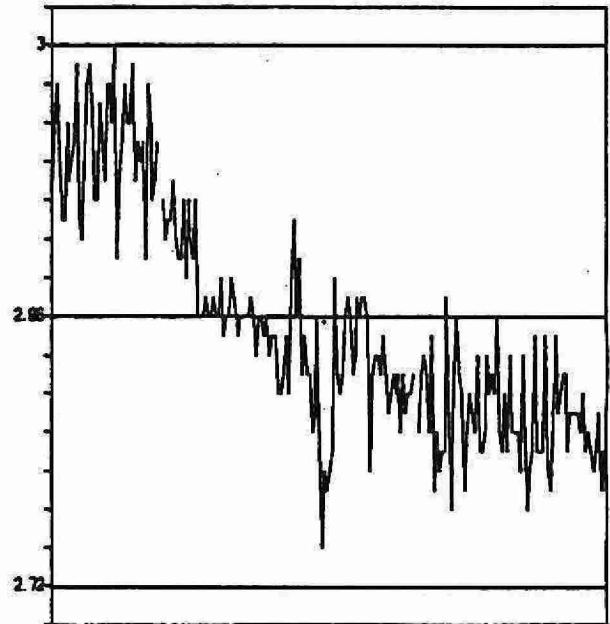
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
201	3.50 - 5.75	0.045	1.1
180	5.75 - 6.25	0.060	1.0
180	6.25 - 14.00	0.052	0.9
561	Overall	0.052	

pH - DOCOP

QUALITY CONTROL DATA FROM 04/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

————— CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: pH	Units	: dimensionless
Work Station Code	: DOT	Unit Code	: nil
Method Code	: 0902PH	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Groundwater		

SAMPLING:

Quantity Required	:150 mL
Container	:250 mL Amber polyethylene or BOD bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

pH is measured directly on a stirred sample (100 mL) at room temperature. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards. Alkalinity (Gran) is performed simultaneously.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration	: BL plus 2 standards, e.g. QCA, QCB
Drift	: 2 standard buffers - 2 times daily

pH - DOT

QUALITY CONTROL DATA FROM 10/01/89 TO 30/11/89

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	108	6.86	6.86	0.00	0.014
b :	108	4.00	4.01	-0.01	0.047
a+b :	108	10.86	10.86	0.00	0.050
a-b :	108	2.86	2.86	0.00	0.048

s.d.(AB) Sw(within run): 0.034 S(between runs): 0.035 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

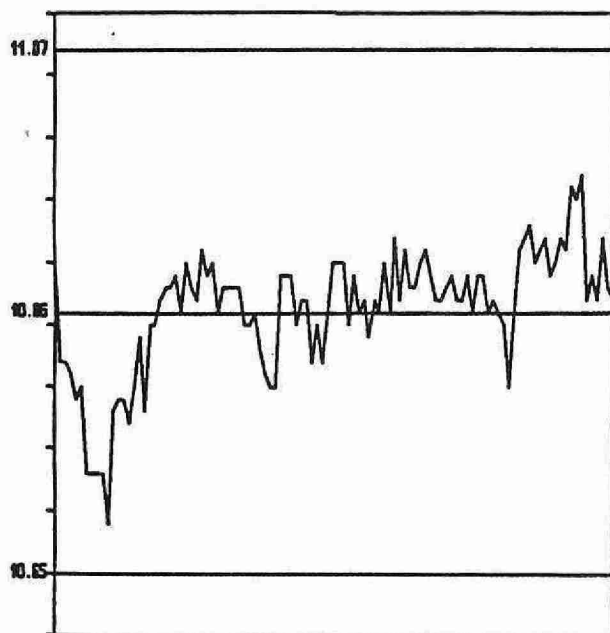
10.65 - 11.07 for A+B
2.72 - 3.00 for A-B

DUPLICATES:

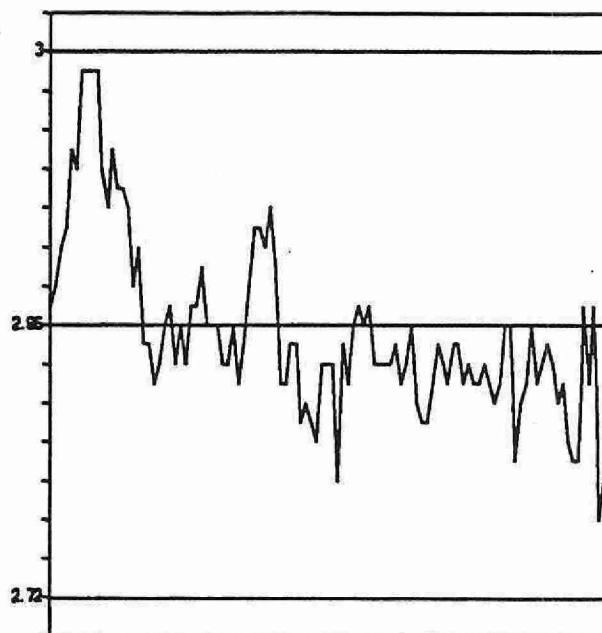
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
85	4.0 - 5.5	0.021	0.4
97	5.5 - 6.0	0.021	0.4
125	6.0 - 9.0	0.032	0.7
307	Overall	0.025	

pH - DOT

QUALITY CONTROL DATA FROM 10/01/89 TO 30/11/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** PH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: PHACD	Unit Code	: nil
Method Code	: 002A11	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.
Total fixed endpoint acidity and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

PH - PHACD

QUALITY CONTROL DATA FROM 06/01/89 TO 29/12/89

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	89	4.45	4.47	0.02	0.038
b :	89	3.75	3.77	0.02	0.031
a+b :	89	8.20	8.24	0.04	0.055
a-b :	89	0.70	0.71	0.01	0.043

s.d.(AB) Sw(within run): 0.03 S(between runs): 0.03 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

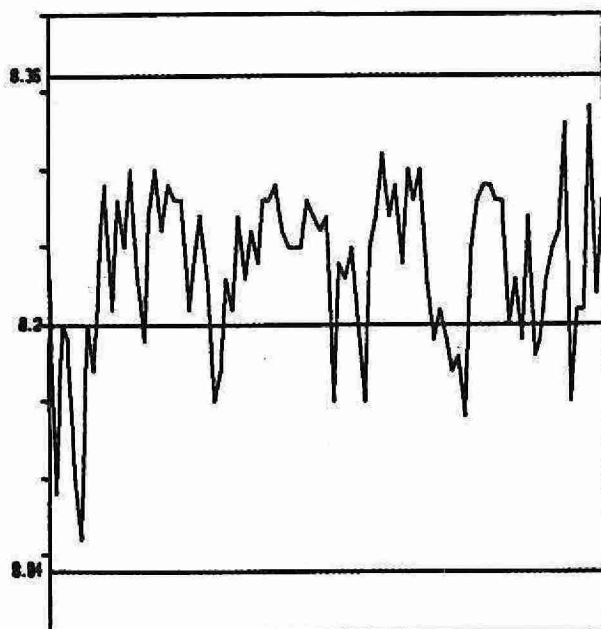
8.04 - 8.36 for A+B
0.59 - 0.81 for A-B

DUPLICATES:

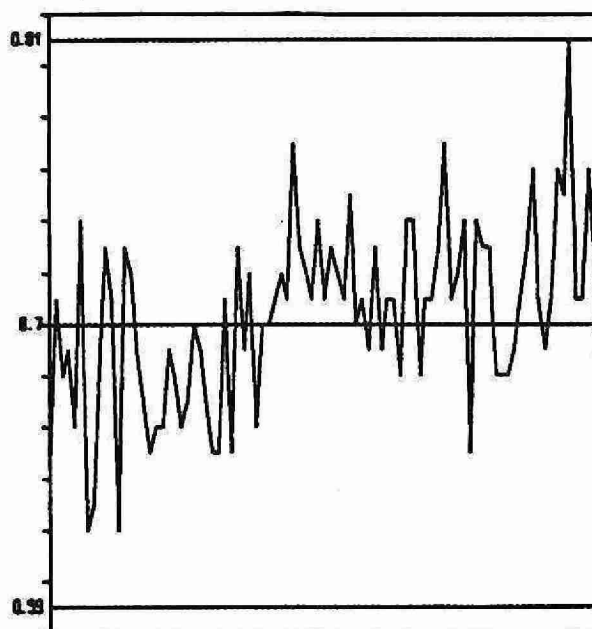
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
10	3.0 - 4.0	0.017	0.4
134	4.0 - 5.0	0.025	1.5
37	5.0 - 14.0	0.052	1.8
181	Overall	0.029	

pH - PHACD

QUALITY CONTROL DATA FROM 06/01/89 TO 29/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: RATS	Unit Code	: nil
Method Code	: 003AI2	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Gran alkalinity, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration : 2 standards e.g. QCA
Drift : In run standards throughout the run (tap water diluted to 20% V/V)

PH - RATS

QUALITY CONTROL DATA FROM 10/01/89 TO 20/12/89

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	89	7.41	7.44	0.03	0.028
b :	89	4.45	4.53	0.08	0.061
a+b :	89	11.86	11.97	0.11	0.071
a-b :	89	2.96	2.91	-0.05	0.063

s.d.(AB) Sw(within run): 0.04 S(between runs): 0.05 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

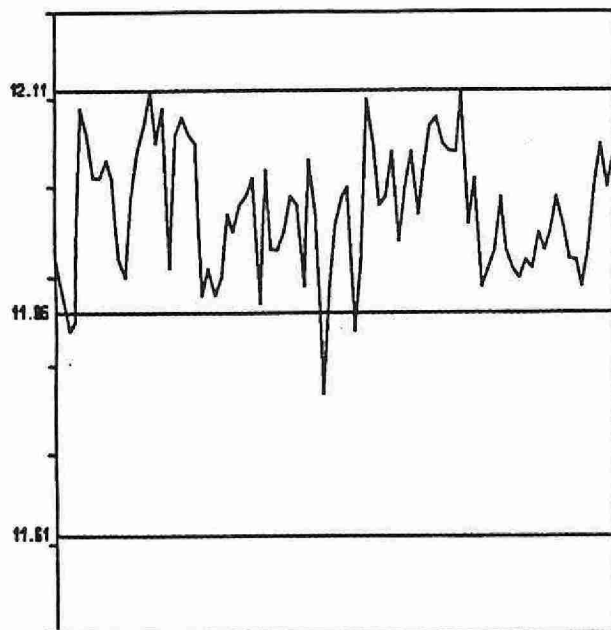
11.61 - 12.11 for A+B
2.79 - 3.13 for A-B

DUPLICATES:

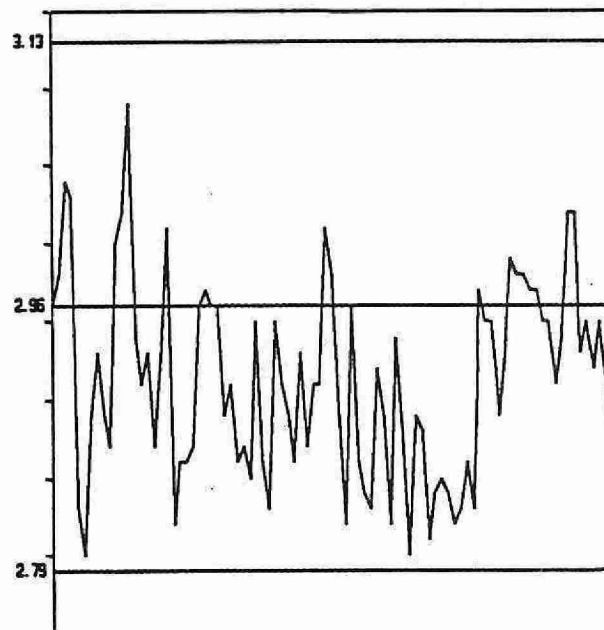
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
78	2.00 - 7.85	0.114	1.0
84	7.85 - 8.15	0.094	1.0
79	8.15 - 9.00	0.077	1.2
241	Overall	0.095	

PH - RATS

QUALITY CONTROL DATA FROM 10/01/89 TO 20/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** PH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WATS	Unit Code	: nil
Method Code	: 003A12	Supervisor	: F. Lo
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Total fixed endpoint alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration : 2 standards e.g. QCA
Drift : In run standards throughout the run (tap water diluted to 50% V/V)

PH - WATS

QUALITY CONTROL DATA FROM 05/01/89 TO 21/11/89

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	105	7.41	7.441	0.031	0.032
b :	105	4.45	4.485	0.035	0.048
a+b :	105	11.86	11.927	0.067	0.063
a-b :	105	2.96	2.956	-0.004	0.051

s.d.(AB) Sw(within run): 0.036 S(between runs): 0.041 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

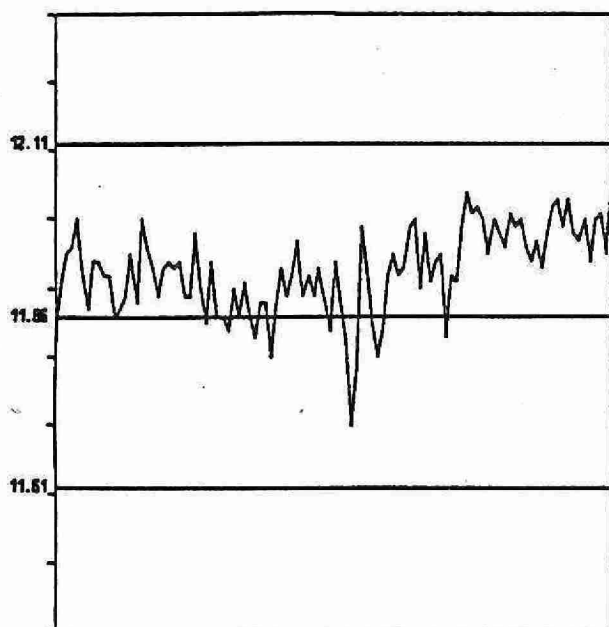
11.61 - 12.11 for A+B
2.79 - 3.13 for A-B

DUPLICATES:

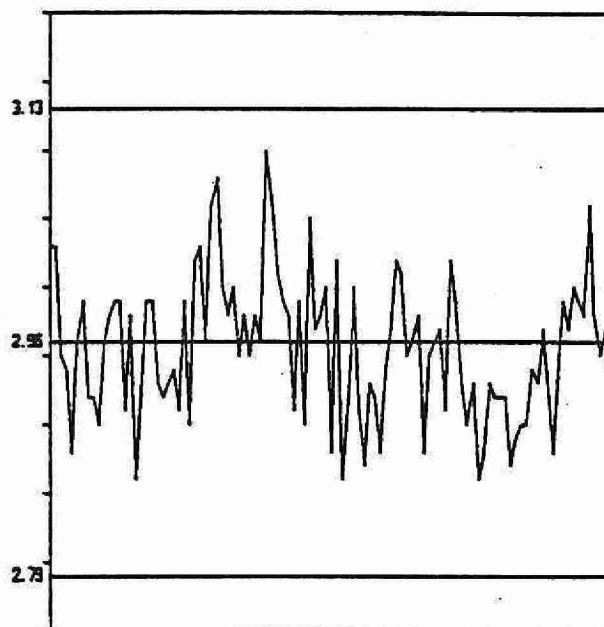
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
91	2.00 - 7.80	0.196	2.4
100	7.80 - 8.05	0.152	1.7
98	8.05 - 14.00	0.087	1.0
289	Overall	0.148	

PH - WATS

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '70
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WQSDIRT	Unit Code	: Nil
Method Code	: 004AI4	Supervisor	: F. Lo
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 15 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (15 mL) at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, Radiometer combination electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : 2 standards e.g. QCA

PH - WQSDIRT

QUALITY CONTROL DATA FROM 17/01/89 TO 18/12/89

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	36	7.41	7.4411	0.0311	0.033
b :	36	4.45	4.4808	0.0308	0.047
a+b :	36	11.86	11.9220	0.0620	0.043
a-b :	36	2.96	2.9603	0.0003	0.070

s.d.(AB) Sw(within run): 0.049 S(between runs): 0.041 S/Sw: 0.83

On any given day the calibration is accepted if the values obtained lie within the ranges:

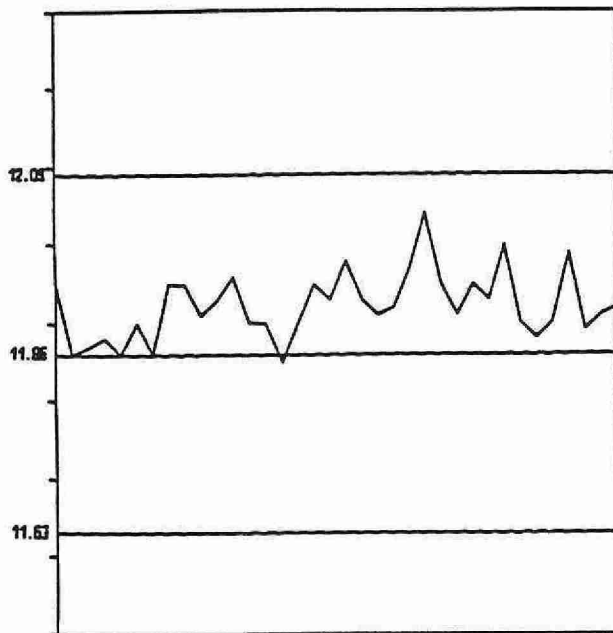
11.63 - 12.09 for A+B
2.81 - 3.11 for A-B

DUPLICATES:

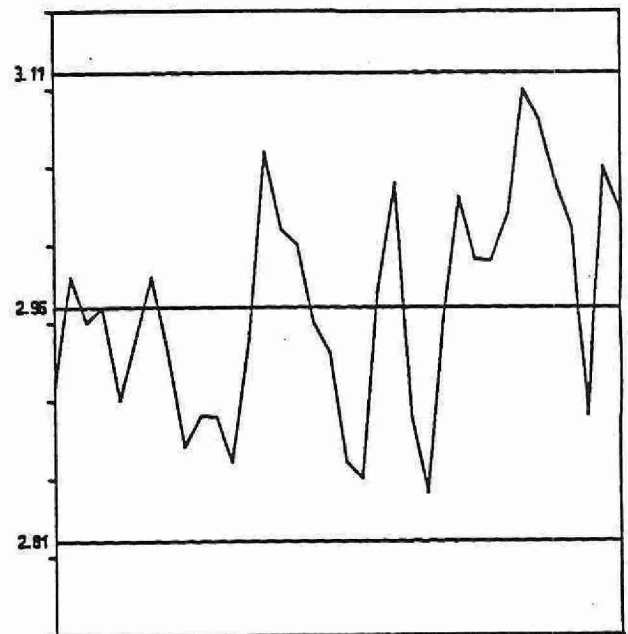
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	6.00 - 7.00	0.033	0.5
37	7.00 - 8.00	0.054	0.9
27	8.00 - 9.00	0.032	0.6
68	Overall	0.043	

PH - WQSDIRT

QUALITY CONTROL DATA FROM 17/01/89 TO 18/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** pH - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHECA	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 324AB1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to < 2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (< 2 mm) plus 20 mL 0.01 M calcium chloride are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. pH is measured on the supernatant.

INSTRUMENTATION:

-Corning pH/ion meter 150
-Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 2 Calculated W value: N/A T value: N/A

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers
Recovery : 3 long term soil samples plus a round robin ECSS sample (latter run occasionally).

pH - DOSOILPH (PHECA)

QUALITY CONTROL DATA FROM 21/03/89 TO 12/09/89

Lab: Dorset Soils

Analytical Range: - to 10 Dimensionless

CALIBRATION CONTROL:

	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
a :	22	7.0	6.99	-0.01	0.033
b :	22	4.0	3.98	-0.02	0.035
a+b :	22	11.0	10.97	-0.03	0.062
a-b :	22	3.0	3.00	0.00	0.029
c :	14	6.8	6.79	-0.01	0.041
d :	14	4.0	3.98	-0.02	0.043
c+d :	14	10.8	10.77	-0.03	0.080
c-d :	14	2.8	2.80	0.00	0.026

s.d.(AB) Sw(within run): 0.021 S(between runs): 0.034 S/Sw: 1.66

s.d.(CD) Sw(within run): 0.018 S(between runs): 0.042 S/Sw: 2.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.70	-	11.30	for	A+B
2.80	-	3.20	for	A-B
10.50	-	11.10	for	C+D
2.60	-	3.00	for	C-D

RECOVERIES:

	<u>Number of Data</u>	<u>Av. Concn Measured</u>	<u>Standard(1) Deviation</u>
R1 :	12	7.51	0.170
R2 :	19	4.70	0.200
R3 :	11	4.74	0.095

DUPLICATES:

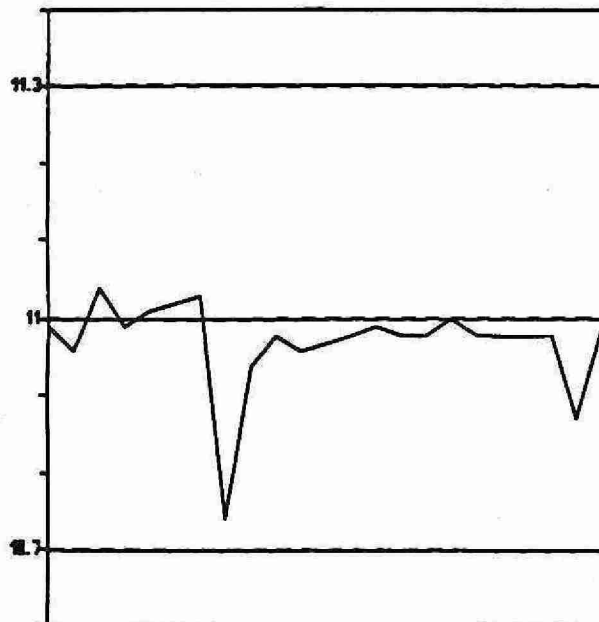
<u>Number of Data Pairs</u>	<u>Sample Concn Span</u>	<u>Mean(2) s.d.</u>	<u>Coefficient of var.(%)</u>
17	1.0 - 5.0	0.027	0.6
15	5.0 - 10.0	0.070	1.1
32	Overall	0.042	

OTHER CHECKS:

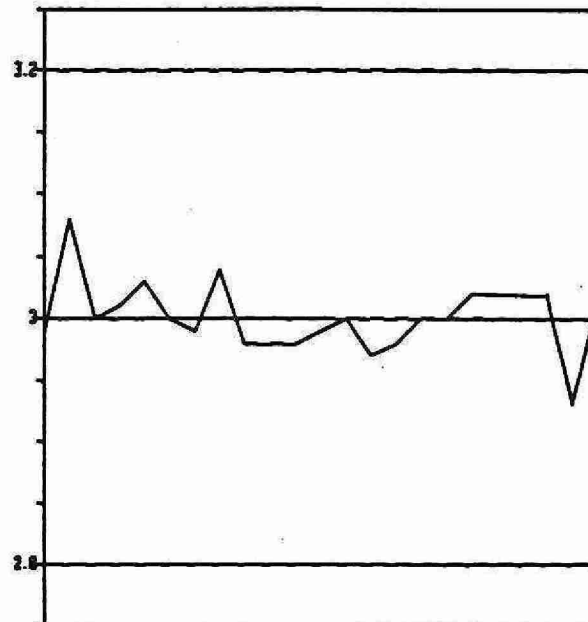
	<u>Number of Data</u>	<u>Data Mean</u>	<u>Standard(1) Deviation</u>
Slope	3	57.69	1.148

pH - SOIL - DOSOILPH (PHECA)

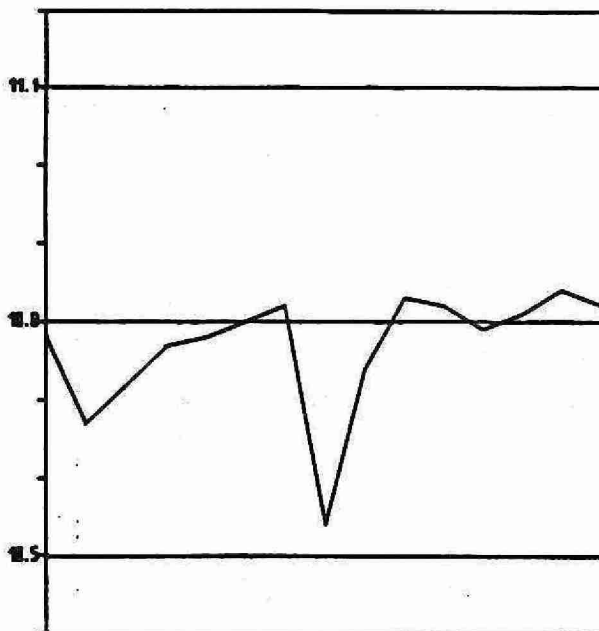
QUALITY CONTROL DATA FROM 21/03/89 TO 12/09/89



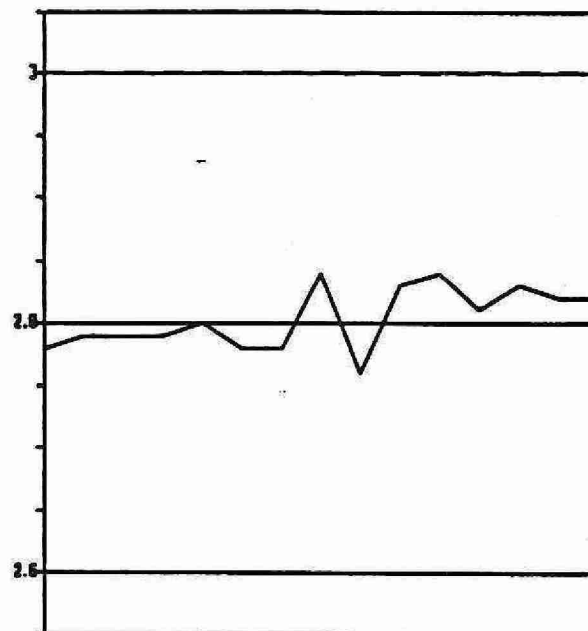
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** pH - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHEW	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 304AB1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or plastic jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL of deionized water are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. pH is measured on the supernatant.

INSTRUMENTATION:

- Corning pH/ion meter 150
- Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: N/A T value: N/A.

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers
Recovery : 3 long term soil samples plus a round robin ECSS sample (run occasionally).

pH - DOSOILPH (PHEW)

QUALITY CONTROL DATA FROM 29/03/89 TO 15/09/89

Lab: Dorset Soils

Analytical Range: - to 10 Dimensionless

CALIBRATION CONTROL:

	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
a :	22	7.0	6.99	-0.01	0.033
b :	22	4.0	3.98	-0.02	0.035
a+b :	22	11.0	10.97	-0.03	0.062
a-b :	22	3.0	3.00	0.00	0.029
c :	14	6.8	6.79	-0.01	0.041
d :	14	4.0	3.98	-0.02	0.043
c+d :	14	10.8	10.77	-0.03	0.080
c-d :	14	2.8	2.80	0.00	0.026

s.d.(AB) Sw(within run): 0.021 S(between runs): 0.034 S/Sw: 1.66

s.d.(CD) Sw(within run): 0.018 S(between runs): 0.042 S/Sw: 2.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.70	-	11.30	for	A+B
2.80	-	3.20	for	A-B
10.50	-	11.10	for	C+D
2.60	-	3.00	for	C-D

RECOVERIES:

	<u>Number of Data</u>	<u>Av. Concn Measured</u>	<u>Standard(1) Deviation</u>
R1 :	19	8.57	0.134
R2 :	18	5.27	0.427
R3 :	19	5.34	0.146

DUPLICATES:

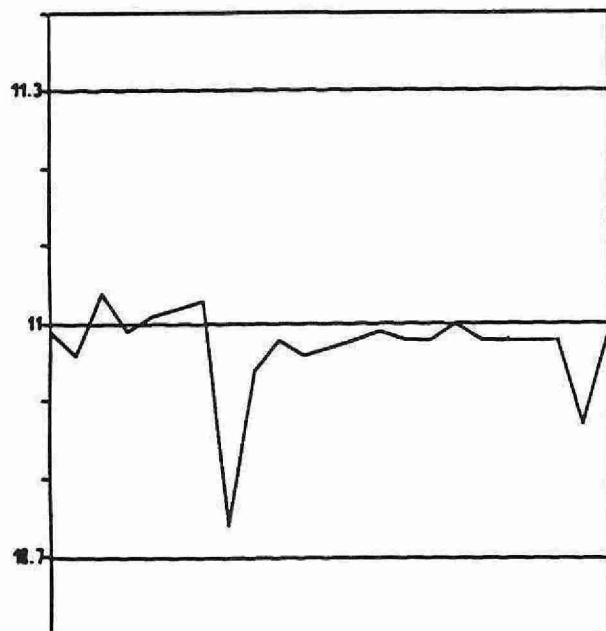
<u>Number of Data Pairs</u>	<u>Sample Concn Span</u>		<u>Mean(2) s.d.</u>	<u>Coefficient of var.(%)</u>
14	3.0	- 5.0	0.024	0.5
19	5.0	- 7.0	0.075	1.2
3	7.0	- 10.0	0.056	0.7
36	Overall		0.059	

OTHER CHECKS:

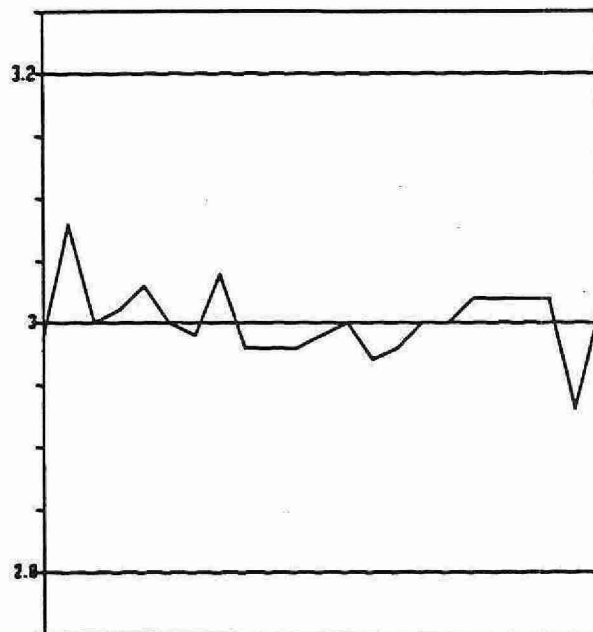
	<u>Number of Data</u>	<u>Data Mean</u>	<u>Standard(1) Deviation</u>
Slope	3	57.69	1.148

pH - SOIL - DOSOILPH (PHEW)

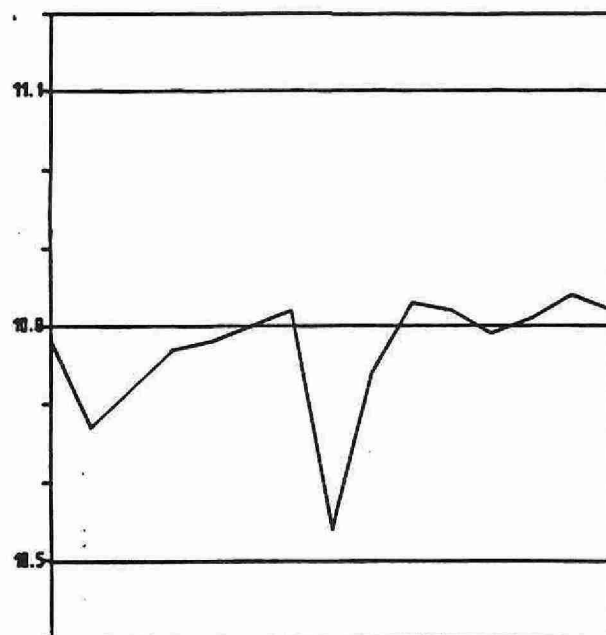
QUALITY CONTROL DATA FROM 29/03/89 TO 15/09/89



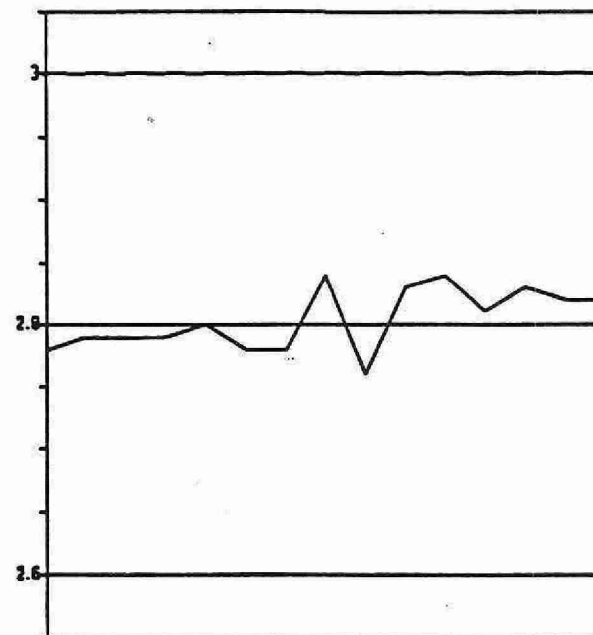
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** PHENOLICS - REACTIVE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: PHNOL	Units	: ug/L as Phenol
Work Station Code	: ROPHEN	Unit Code	: 063704
Method Code	: 002BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass
Preservative	: Sulfuric acid to pH 1.5 - 2
Other	: Special bottle (with white cap) containing preservative is available

ANALYTICAL PROCEDURE:

Samples are automatically distilled from an acid media, and reactive phenolics in the distillate are determined colourimetrically by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide.

Approximate absorbance: 0.03 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, standard, BL every 10 samples

NOTES:

1. A report identifying reactive phenolics is available on request.
2. As of June 4, 1989, the copper sulphate-phosphoric acid preservative was discontinued in favour of preservation by sulfuric acid to pH 1.5 - 2.

PHENOLICS - REACTIVE - ROPHEN

QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 50.0 ug/L as Phenol

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	103	40	40.05	0.05	0.584
b :	103	10	10.18	0.18	0.336
a+b :	103	50	50.23	0.23	0.754
a-b :	103	30	29.88	-0.12	0.582

s.d.(AB) Sw(within run): 0.41 S(between runs): 0.48 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

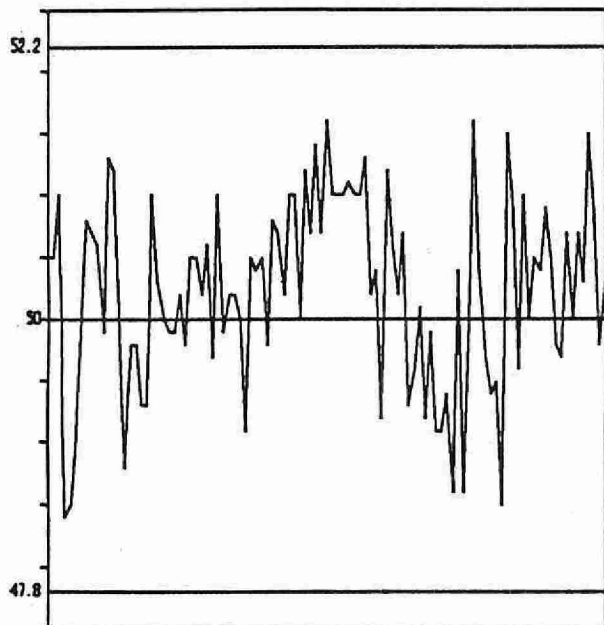
47.8 - 52.2 for A+B
28.5 - 31.5 for A-B

DUPLICATES:

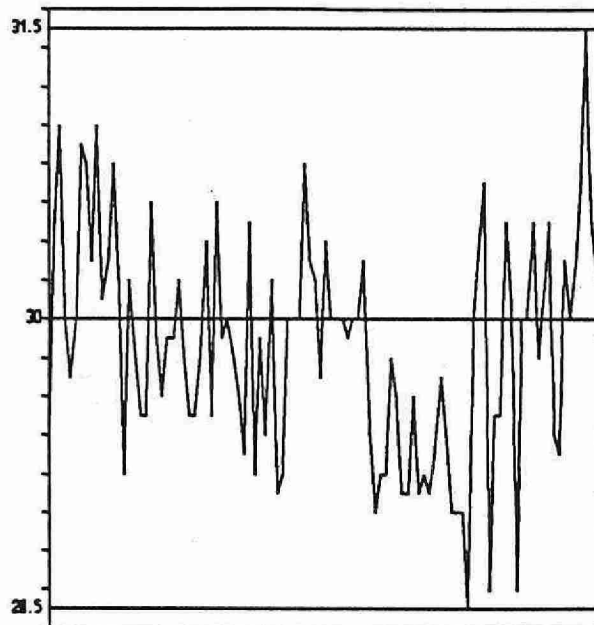
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
44	0.0	-	0.5	0.148	122.3
212	0.5	-	5.0	0.257	37.9
39	5.0	-	50.0	0.848	8.0
295	Overall			0.275	

PHENOLICS REACTIVE - ROPHEN (UG/L AS Phenol)

QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** BRAY II EXTRACTABLE PHOSPHORUS *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1988
LIS Test Name Code	: PPO4BE	Units	: ug/g as P
Work Station Code	: DOBEP	Unit Code	: 073815
Method Code	: 5926C3	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 10 g air dried and sieved to < 2mm.
Container : Glass or Plastic

ANALYTICAL PROCEDURE:

A soil samples is weighed into centrifuge tubes. 25 ml of NH₄F-HCl extractant is added and the tubes are capped and shaken for 1 hour. Samples are centrifuged and filtered through 0.45 um filters. The filtrate is analyzed by colourimetry.

INSTRUMENTATION:

Technicon colourimeter, peristaltic pump, sampler, and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

6 standards covering the range 0 - 100 ug/g P

CONTROLS:

3 long term soil samples and 2 method blanks
QCA, QCB prepared by judiciously mixing previously analyzed samples; enough is prepared for 1 yr (1 litre)

BRAY II EXTRACTABLE PHOSPHORUS - DOBEP

QUALITY CONTROL DATA FROM 25/07/89 TO 15/12/89

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	14	82.50	82.64	0.14	1.45
b :	14	31.00	31.02	0.02	1.17
a+b :	14	113.50	113.66	0.16	1.94
a-b :	14	51.50	51.62	0.12	1.77

s.d.(AB) Sw(within run): 1.25 S(between runs): 1.31 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

106 - 121 for A+B
46.5 - 56.5 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	17	168	7.314
R2 :	14	15.4	2.771
R3 :	14	11.8	1.000

DUPLICATES:

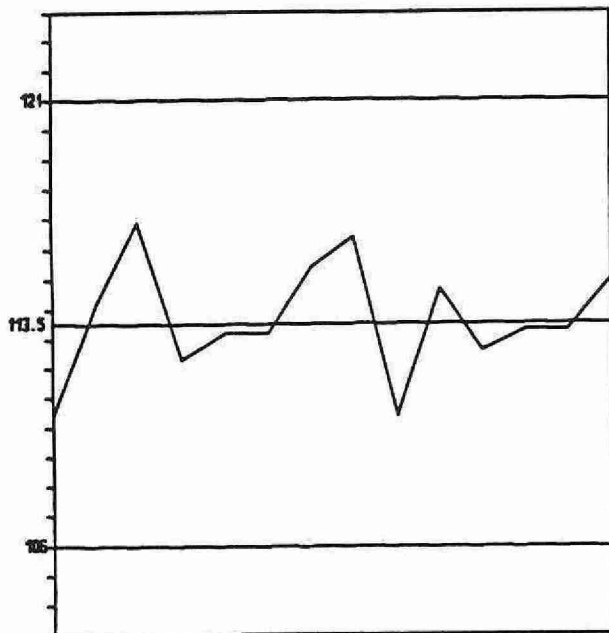
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
27	0.0 - 20.0	0.936	11.2
13	20.0 - 50.0	3.860	9.8
6	50.0 - 100.0	7.666	10.3
40	Overall	2.773	

OTHER CHECKS:

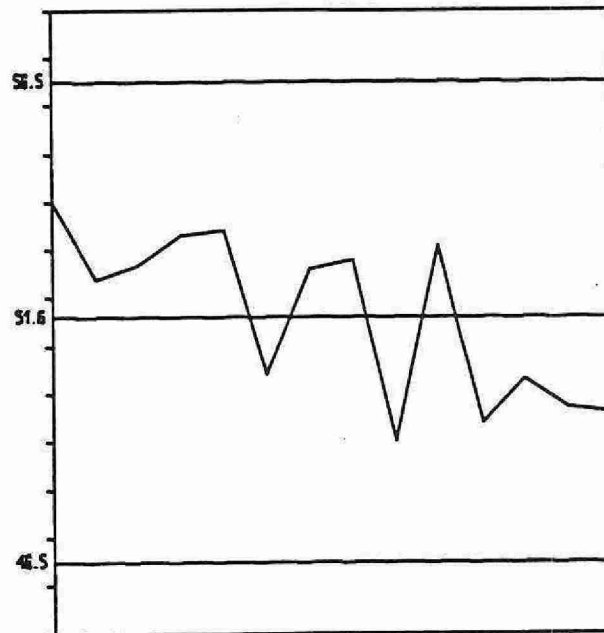
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	17	0.118	0.294

BRAY II EXTRACTABLE PHOSPHOROUS - SOIL -

DOSEP (UG/G AS G)
QUALITY CONTROL DATA FROM 25/07/89 TO 15/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** PHOSPHORUS -REACTIVE ortho-PHOSPHATE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: RNDNP	Unit Code	: 064815
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.2 at the full scale level.
Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.0005 T value: 0.0025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples

PHOSPHORUS-REACTIVE ortho-PHOSPHATE - RNDNP

QUALITY CONTROL DATA FROM 09/01/89 TO 19/12/89

Lab: Colourimetry

Analytical Range: - to 0.10 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	149	0.08	0.0797	0.0003	0.0008
b :	149	0.04	0.0400	0.0000	0.0006
a+b :	149	0.12	0.1198	0.0002	0.0012
a-b :	149	0.04	0.0397	0.0003	0.0008
c :	149	0.04	0.0400	0.0000	0.0006
d :	149	0.008	0.0080	0.0000	0.0006
c+d :	149	0.048	0.0480	0.0000	0.0009
c-d :	149	0.032	0.0321	-0.0001	0.0007

s.d.(AB) Sw(within run): 0.0006 S(between runs): 0.0007 S/Sw: 1.26

s.d.(CD) Sw(within run): 0.0005 S(between runs): 0.0006 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.115	-	0.125	for	A+B
0.037	-	0.043	for	A-B
0.045	-	0.510	for	C+D
0.030	-	0.034	for	C-D

DUPLICATES:

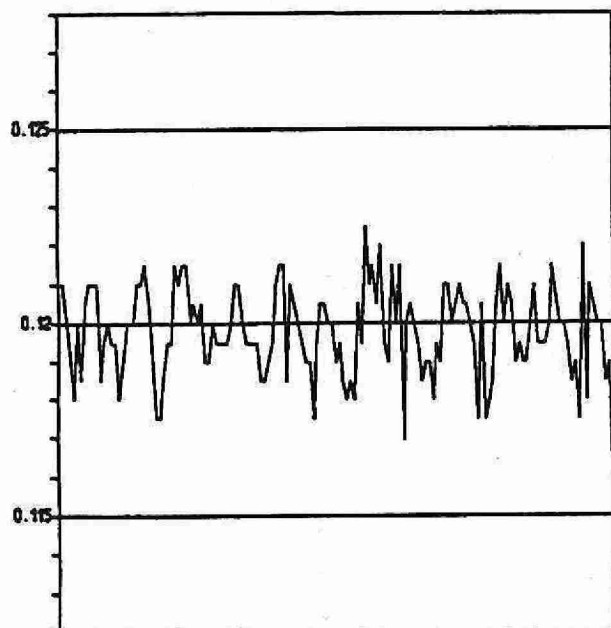
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
245	0.00	-	0.01	0.0010	60.6
23	0.01	-	0.02	0.0012	8.1
47	0.02	-	0.10	0.0017	3.5
315	Overall			0.0011	

OTHER CHECKS:

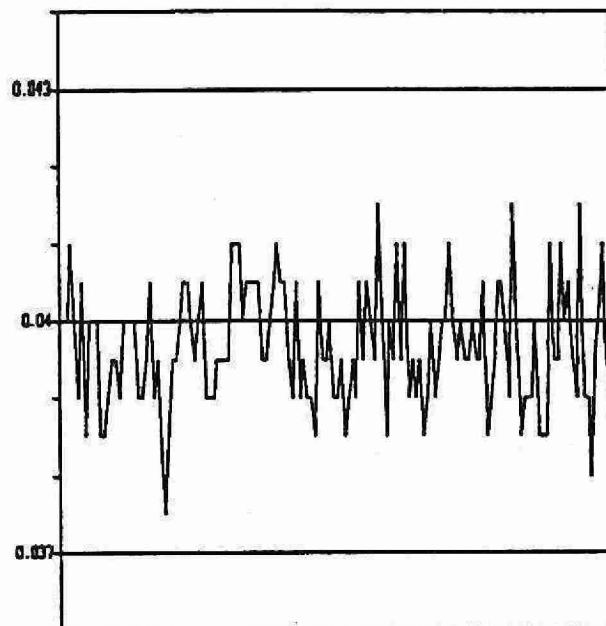
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	140	0.000	0.0005

PHOSPHORUS-REACTIVE ortho-PHOSPHATE- RNDNP (MG/L AS P)

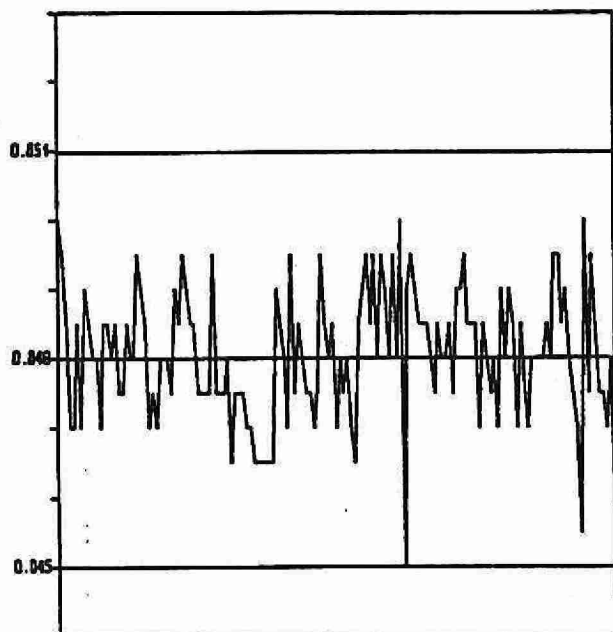
QUALITY CONTROL DATA FROM 09/01/89 TO 19/12/89



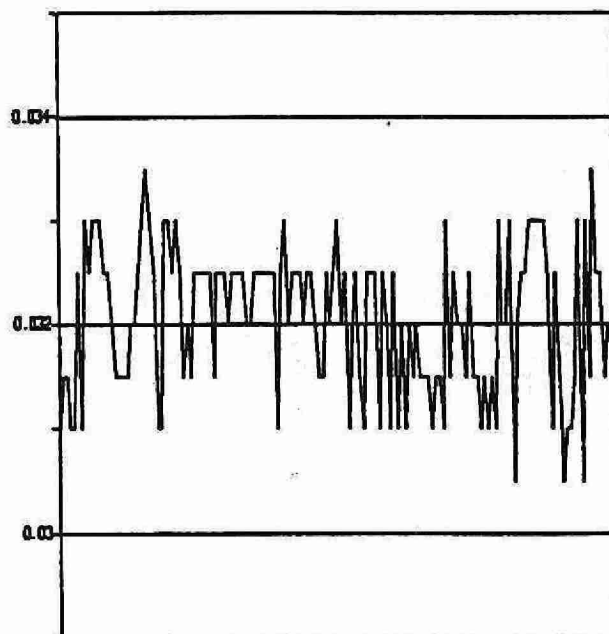
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** PHOSPHORUS - REACTIVE ortho-PHOSPHATE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: SDNP	Unit Code	: 064815
Method Code	: 103BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.5 at the full scale level.

Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube. Data capture, reduction, and processing via a multi-stage micro-computer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA

Drift : BL every 10 samples; standard every 20 samples

PHOSPHORUS-REACTIVE ortho-PHOSPHATE - SDNP

QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	142	8.0	7.98	-0.01	0.060
b :	142	4.0	4.01	0.01	0.029
a+b :	142	12.0	11.99	-0.01	0.071
a-b :	142	4.0	3.98	-0.02	0.061
c :	142	0.8	0.81	0.01	0.029
d :	142	4.0	4.01	0.01	0.017
c+d :	142	4.8	4.81	0.01	0.034
c-d :	142	3.2	3.20	0.00	0.033

s.d.(AB) Sw(within run): 0.04 S(between runs): 0.05 S/Sw: 1.08

s.d.(CD) Sw(within run): 0.02 S(between runs): 0.02 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.55	-	12.45	for	A+B
3.70	-	4.30	for	A-B
4.62	-	4.98	for	C+D
3.08	-	3.32	for	C-D

DUPLICATES:

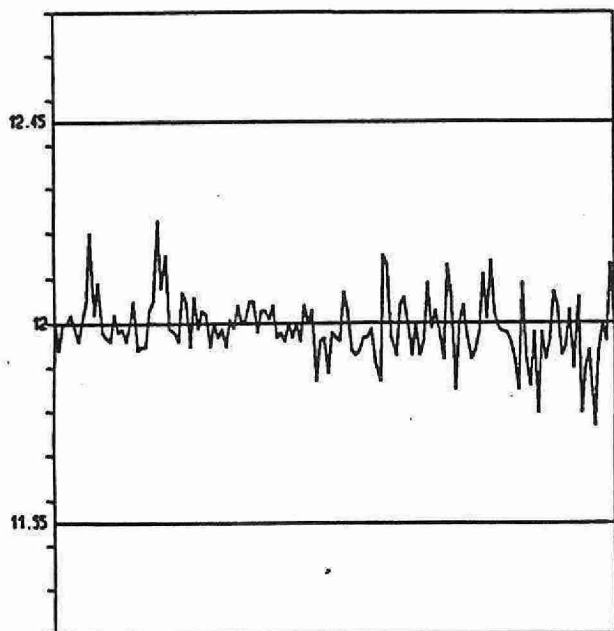
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
107	0.00	-	0.04	0.0191	168.3
62	0.04	-	0.10	0.0210	34.5
56	0.10	-	0.20	0.0266	192.8
65	0.20	-	1.00	0.0290	104.6
29	1.00	-	10.00	0.0389	46.3
319	Overall			0.0237	

OTHER CHECKS:

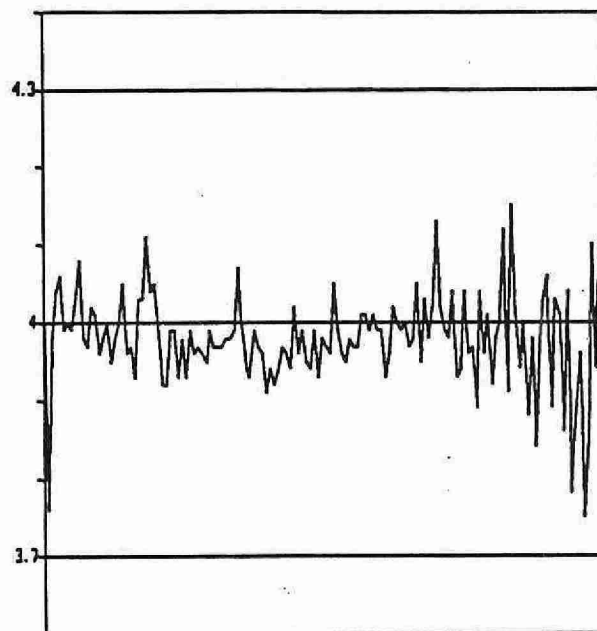
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	130	-0.0006	0.005

PHOSPHORUS-REACTIVE ortho-PHOSPHATE - SDNP (MG/L AS P)

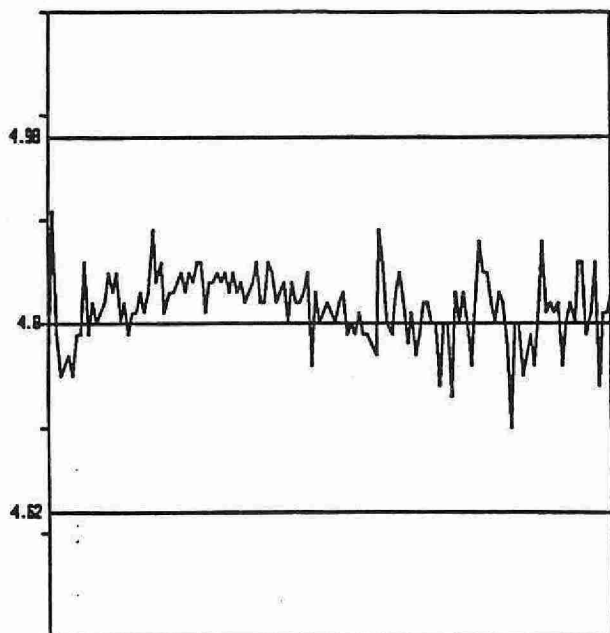
QUALITY CONTROL DATA FROM 05/01/89 TO 28/12/89



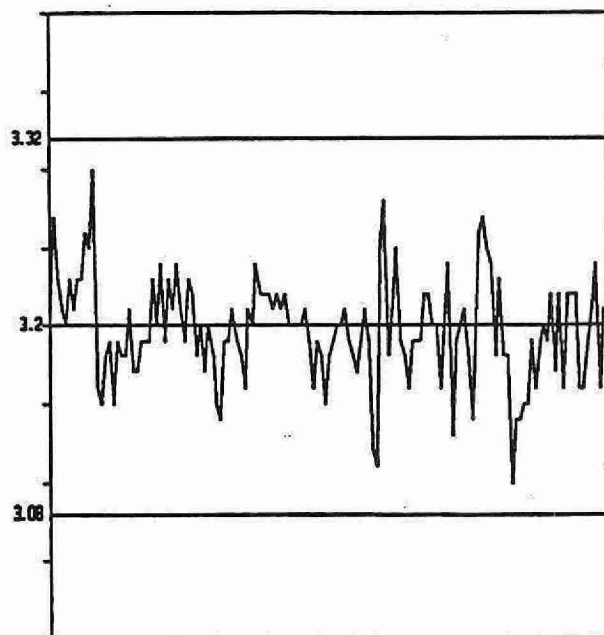
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** TOTAL PHOSPHORUS *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: RTNP	Unit Code	: 064815
Method Code	: 504AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.4 at the full scale level.

Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

Three Block digesters

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.

Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.002

T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

TOTAL PHOSPHORUS - RTNP

QUALITY CONTROL DATA FROM 04/01/89 TO 29/12/89

Lab: Colourimetry

Analytical Range: - to 0.20 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	179	0.16	0.1607	0.0007	0.0011
b :	179	0.08	0.0803	0.0003	0.0008
a+b :	179	0.24	0.2409	0.0009	0.0015
a-b :	179	0.08	0.0804	0.0004	0.0013
c :	179	0.08	0.0803	0.0003	0.0008
d :	179	0.016	0.0159	-0.0001	0.0004
c+d :	179	0.096	0.0962	0.0002	0.0010
c-d :	179	0.064	0.0643	0.0003	0.0008

s.d.(AB) Sw(within run): 0.0009 S(between runs): 0.0010 S/Sw: 1.12

s.d.(CD) Sw(within run): 0.0006 S(between runs): 0.0006 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231	-	0.249	for	A+B
0.074	-	0.086	for	A-B
0.092	-	0.100	for	C+D
0.0616	-	0.0664	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	174	0.14	0.137	0.0034
R2 :	177	0.084	0.082	0.0028
R3 :	178	0.028	0.028	0.0020

DUPLICATES:

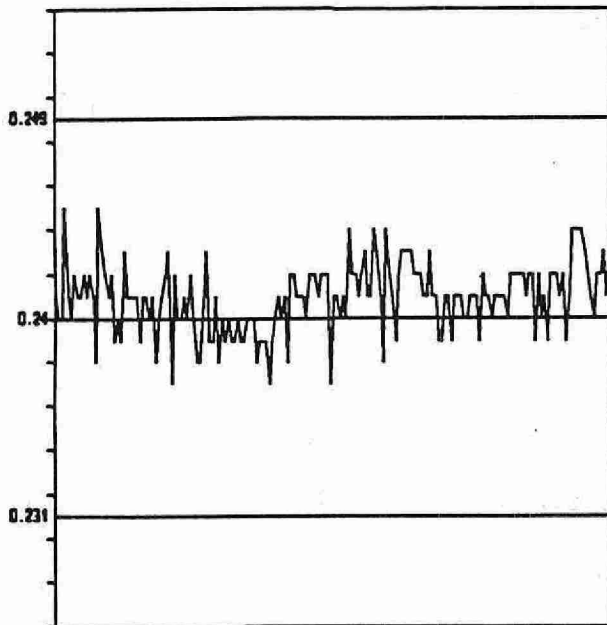
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
403	0.000 - 0.020	0.0016	19.5
77	0.020 - 0.050	0.0026	8.2
27	0.050 - 0.100	0.0029	3.7
12	0.100 - 0.200	0.0034	2.4
519	Overall	0.0018	

OTHER CHECKS:

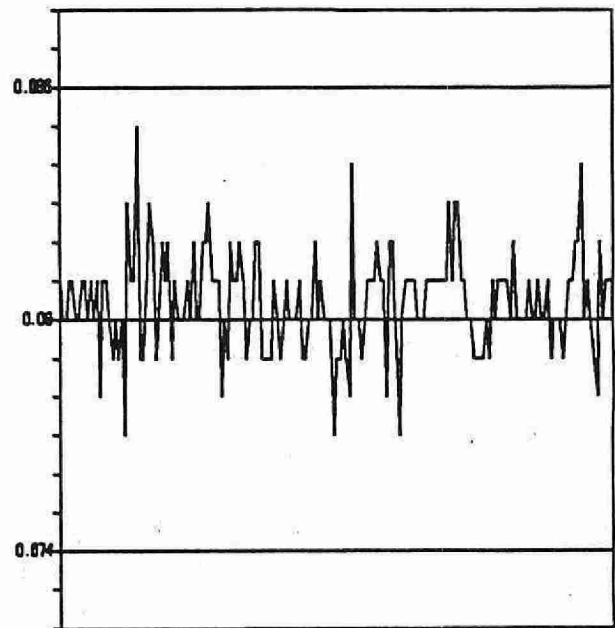
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	168	0.0005	0.0005
Digested Blank	179	0.0013	0.0013

TOTAL PHOSPHOROUS - RTNP (MG/L AS P)

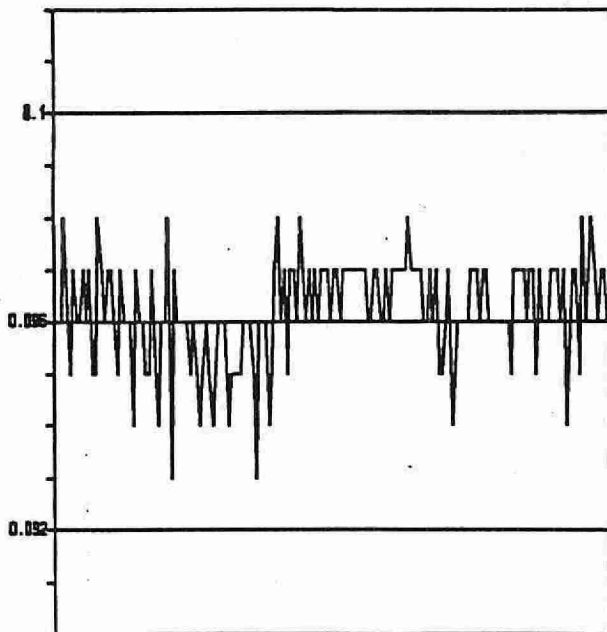
QUALITY CONTROL DATA FROM 04/01/89 TO 29/12/89



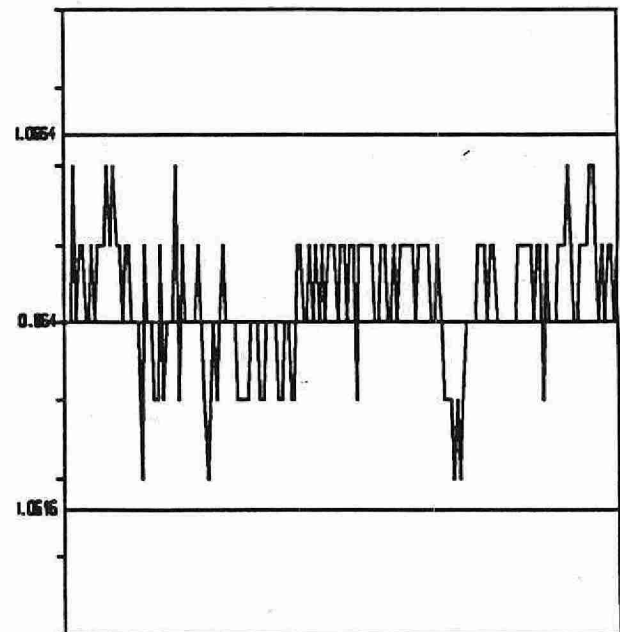
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** TOTAL PHOSPHORUS *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: STKNP	Unit Code	: 064815
Method Code	: 504BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 380°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.8 at the full scale level.

Total Kjeldahl Nitrogen is determined simultaneously.

INSTRUMENTATION:

3-Block digesters

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using an IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; undigested standard every 20 samples

MODIFICATIONS:

02/02/89 -Full scale was changed from 5 to 10 mg/L as P.

Calibration series, QC series, and recoveries were adjusted accordingly.

TOTAL PHOSPHOROUS - STKNP

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	161	8.0	8.001	-0.001	0.0308
b :	161	4.0	3.997	0.003	0.0154
a+b :	161	12.0	11.998	0.002	0.0377
a-b :	161	4.0	4.004	-0.004	0.0309
c :	161	4.0	3.997	0.003	0.0154
d :	161	0.8	0.799	0.001	0.0103
c+d :	161	4.8	4.796	0.004	0.0199
c-d :	161	3.2	3.198	0.002	0.0171

s.d.(AB) Sw(within run): 0.022 S(between runs): 0.024 S/Sw: 1.11

s.d.(CD) Sw(within run): 0.012 S(between runs): 0.013 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.55	-	12.45	for	A+B
3.70	-	4.30	for	A-B
4.62	-	4.98	for	C+D
3.08	-	3.32	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	160	7.0	6.88	0.087
R2 :	159	4.2	4.14	0.046
R3 :	161	1.4	1.39	0.026

DUPLICATES:

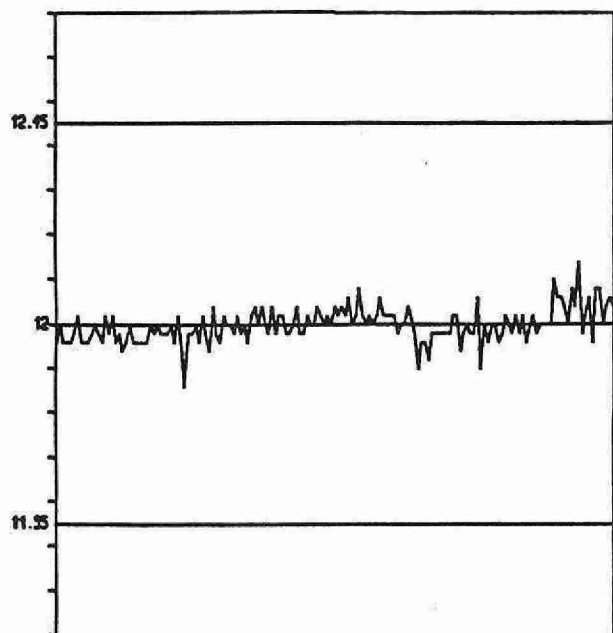
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
292	0.00 - 0.40	0.0129	9.8
70	0.40 - 0.80	0.0178	4.8
44	0.80 - 2.00	0.0269	3.7
15	2.00 - 4.00	0.0512	1.8
8	4.00 - 10.00	0.0491	4.7
429	Overall	0.0151	

OTHER CHECKS:

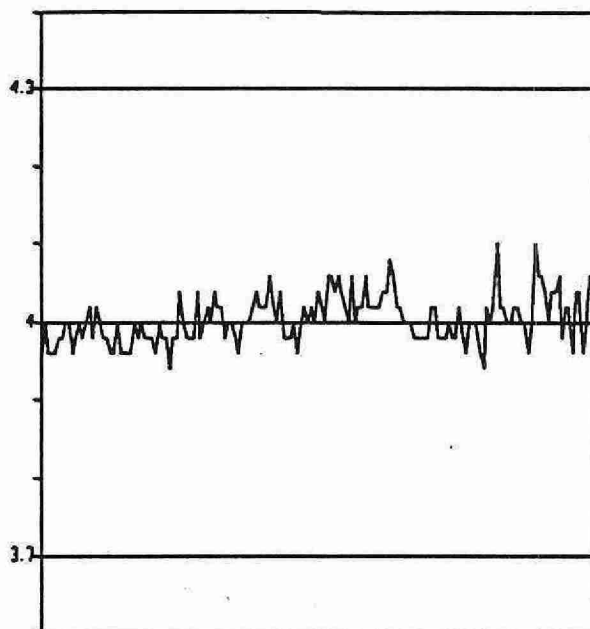
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	161	-0.001	0.004
Digested Blank	161	0.001	0.006

TOTAL PHOSPHORUS -STKNP (MG/L AS P)

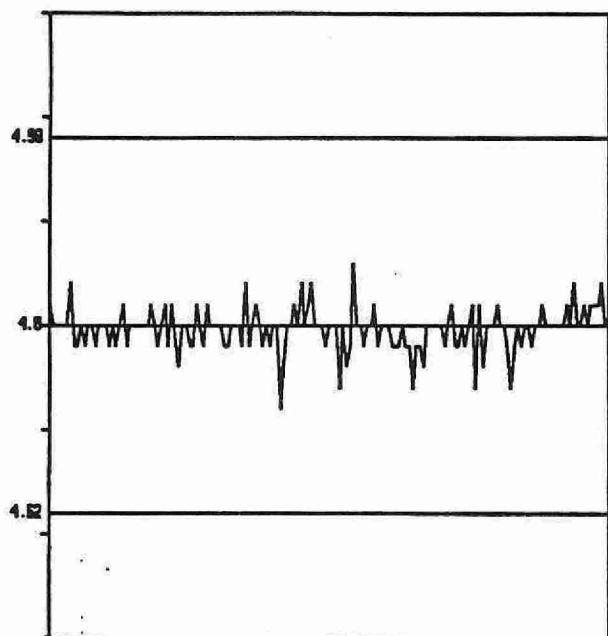
QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89



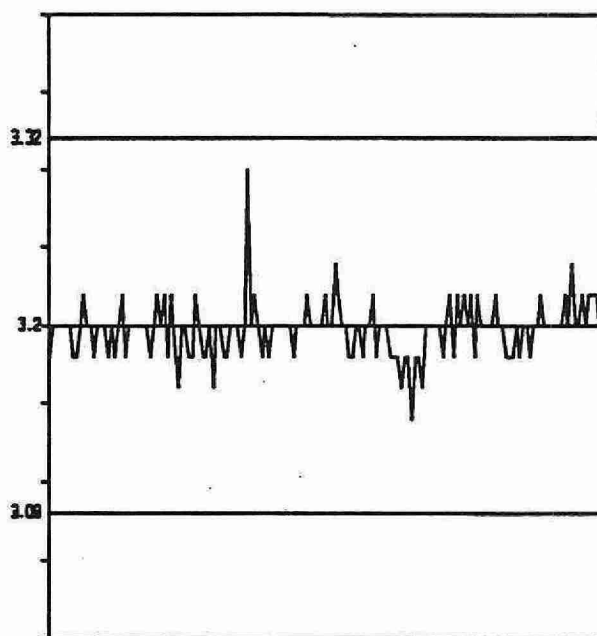
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** TOTAL PHOSPHORUS ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 22/03/79
LIS Test Name Code	: PPUT1, PPUT2	Units	: ug/L as P
Work Station Code	: DOP	Unit Code	: 063815
Method Code	: 5926C2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	:35 mL
Container	:Specially marked Pyrex culture tubes with Teflon-lined caps

ANALYTICAL PROCEDURE:

After withdrawal of excess volume, digestion reagent is added and samples are autoclaved in sulphuric acid-potassium persulphate media at 121°C for 60 min. The orthophosphate content of the digestate is determined colourimetrically by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Autoclave plus basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration	:LTBL plus 4 undigested standards, e.g. QCA
Recovery	:3 digested BL plus 3 digested standards, e.g. R1
Drift	:BL every 10 samples and BL plus 1 undigested standard every 20 samples

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

TOTAL PHOSPHORUS - DOP

QUALITY CONTROL DATA FROM 04/01/89 TO 15/12/89

Lab: Dorset

Analytical Range: - to 200.0 ug/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	68	171.0	171.04	0.04	3.60
b :	68	57.0	57.88	0.88	1.86
a+b :	68	228.0	228.93	0.93	5.13
a-b :	68	114.0	113.16	-0.84	2.57
c :	68	17.1	17.22	0.12	0.49
d :	68	5.7	6.20	0.50	0.65
c+d :	68	22.8	23.43	0.63	0.71
c-d :	68	11.4	11.02	-0.38	0.90

s.d.(AB) Sw(within run): 1.82 S(between runs): 2.87 S/Sw: 1.58

s.d.(CD) Sw(within run): 0.63 S(between runs): 0.57 S/Sw: 0.90

On any given day the calibration is accepted if the values obtained lie within the ranges:

219	-	237	for	A+B
108	-	120	for	A-B
19.8	-	25.8	for	C+D
9.4	-	13.4	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	52	140.0	142.67	3.15
R2 :	68	70.0	71.07	2.68
R3 :	66	14.0	14.11	0.21
R4 :	65	7.0	6.82	0.47

DUPLICATES:

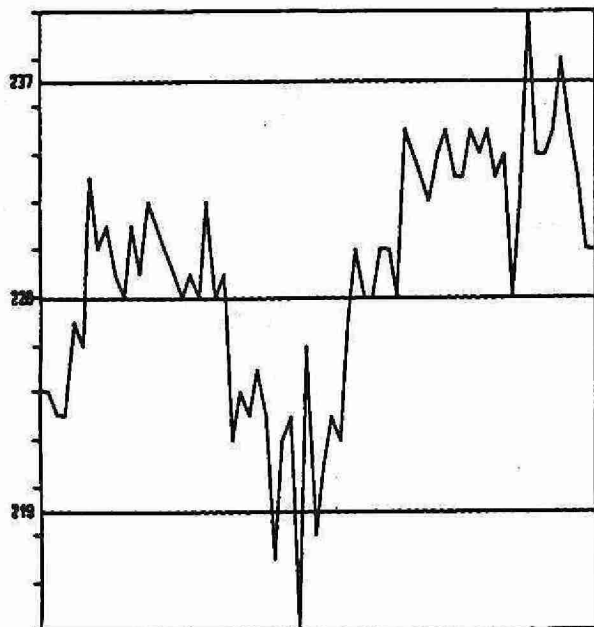
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
61	0.0 - 5.0	0.21	5.7
62	5.0 - 10.0	0.54	7.0
51	10.0 - 20.0	0.86	5.8
21	20.0 - 200.0	1.57	3.7
195	Overall	0.56	

OTHER CHECKS:

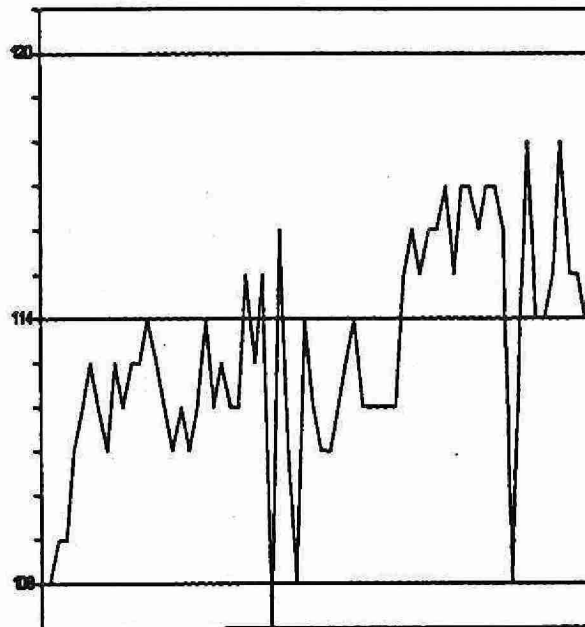
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	66	0.42	0.399
Standard Calibration	61	562.21	98.810
Digested Blank	67	1.29	0.920

TOTAL PHOSPHORUS - DOP (UG/L AS P)

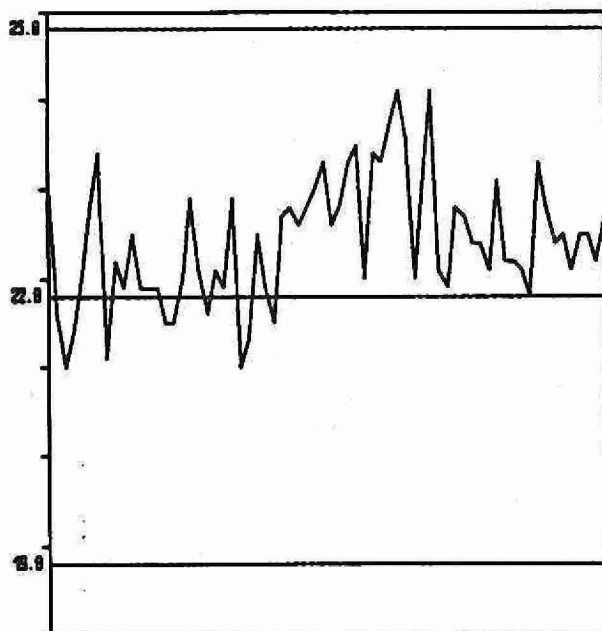
QUALITY CONTROL DATA FROM 04/01/89 TO 15/12/89



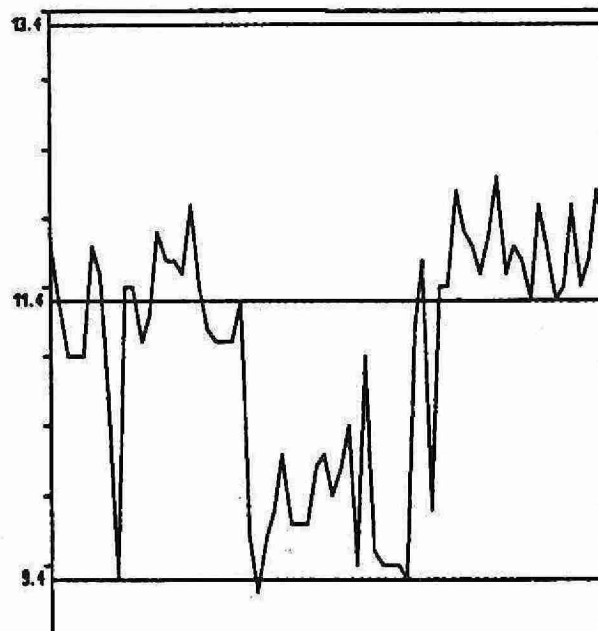
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAA	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: M. Young
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required : 5 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

27/11/89 - Analytical System switched to SpectrAA-400, an automated AAS with an IBM PC/2 Model 30 computer to provide instrument control, data processing and mainframe communications, with BL plus 5 standards

POTASSIUM - PRAA

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89

Lab: Atomic Absorption

Analytical Range: - to 1.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	76	0.60	0.602	0.002	0.008
b :	76	0.10	0.102	0.002	0.004
a+b :	76	0.70	0.704	0.004	0.009
a-b :	76	0.50	0.500	0.000	0.009

s.d.(AB) Sw(within run): 0.006 S(between runs): 0.006 S/Sw:1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 - 0.75 for A+B
0.47 - 0.53 for A-B

DUPLICATES:

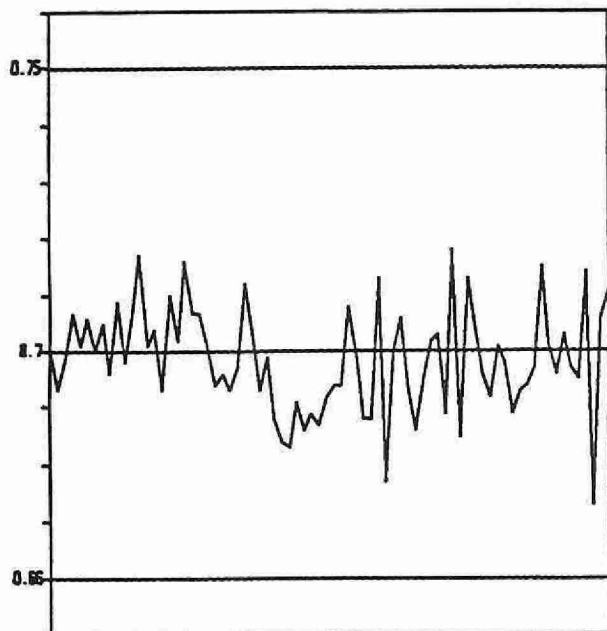
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
171	0.00 - 0.10	0.002	6.9
10	0.10 - 0.20	0.005	3.0
14	0.20 - 0.50	0.003	1.0
2	0.50 - 1.00	0.006	0.6
197	Overall	0.002	N.A.

OTHER CHECKS:

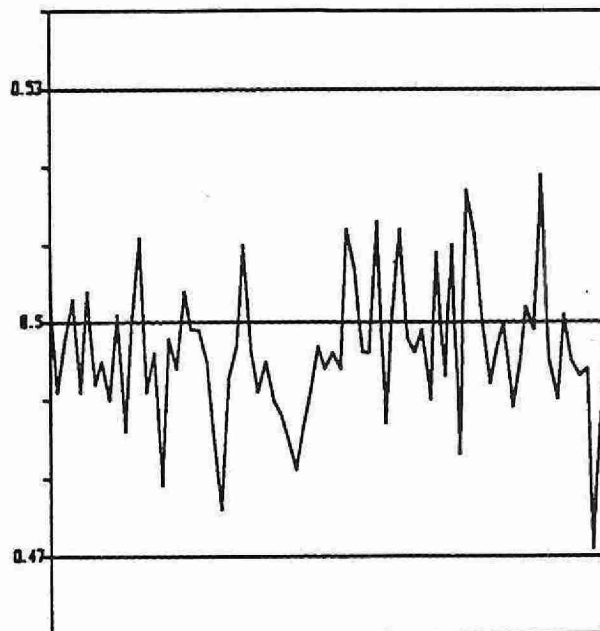
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	76	0.0003	0.0024
Absorbance	34	0.5741	0.1143

POTASSIUM - PRAA (MG/L AS K)

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Pet 500 mL Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

MODIFICATIONS:

20/11/89 - Analytical System switched to SpectrAA-400, an automated AAS with an IBM PC/2 Model 30 computer to provide instrument control, data processing and mainframe communications, with BL plus 5 standards

POTASSIUM - PRAAS

QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89

Lab: Atomic Absorption

Analytical Range: - to 1.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	63	0.80	0.800	0.000	0.012
b :	63	0.20	0.202	0.002	0.005
a+b :	63	1.00	1.000	0.000	0.014
a-b :	63	0.60	0.598	-0.002	0.011
c :	63	0.20	0.202	0.002	0.005
d :	63	0.05	0.051	0.001	0.004
c+d :	63	0.25	0.252	0.002	0.007
c-d :	63	0.15	0.151	0.001	0.005

s.d.(AB) Sw(within run): 0.008 S(between runs): 0.009 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.0038 S(between runs): 0.0043 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.955	-	1.045	for	A+B
0.570	-	0.630	for	A-B
0.205	-	0.295	for	C+D
0.120	-	0.180	for	C-D

DUPLICATES:

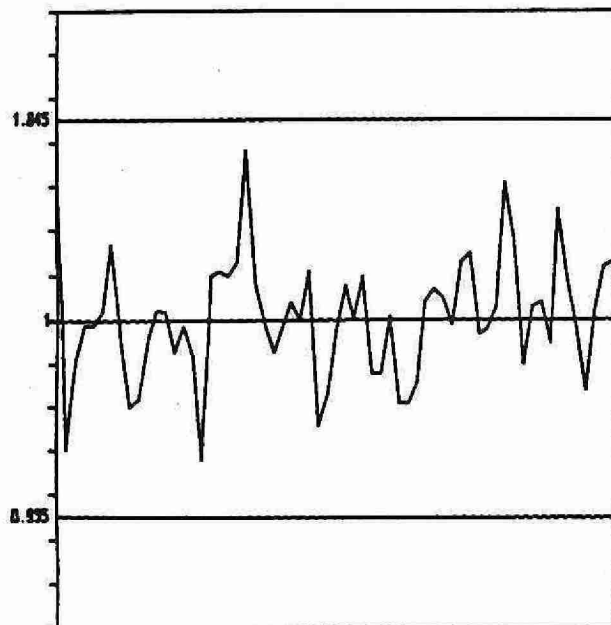
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0.00 - 0.15	0.004	6.7
22	0.15 - 0.25	0.005	2.6
72	0.25 - 0.50	0.006	2.5
43	0.50 - 0.75	0.007	1.8
13	0.75 - 1.00	0.012	1.3
162	Overall	0.006	

OTHER CHECKS:

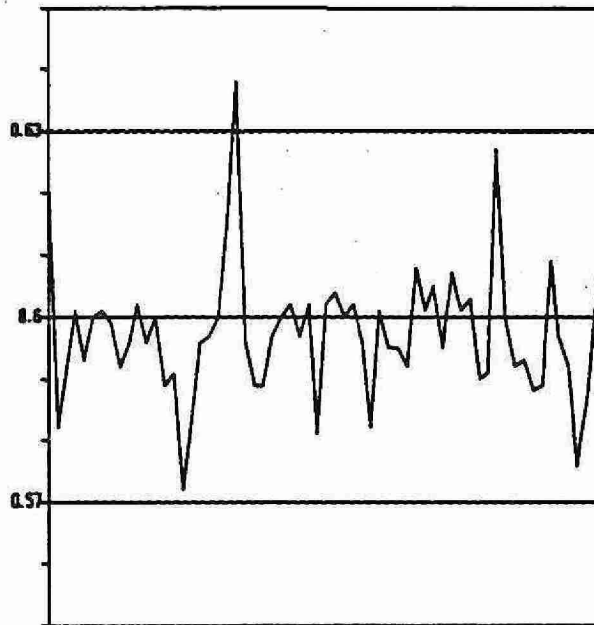
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	63	0.000	0.003
Absorbance	57	0.472	0.154

POTASSIUM - PRAAS (MG/L AS K)

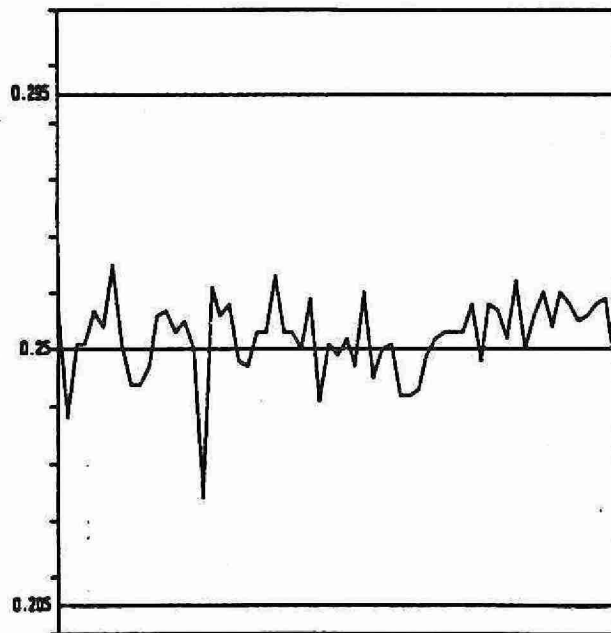
QUALITY CONTROL DATA FROM 18/01/89 TO 19/11/89



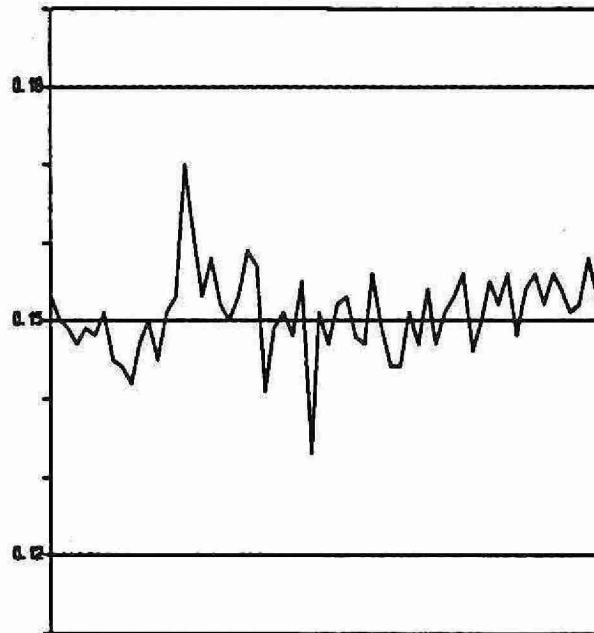
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: KKUR	Units	: ug/Filter as K
Work Station Code	: PRLOV	Unit Code	: 361819
Method Code	: 004BA3	Supervisor	: M. Young
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples were analyzed by AAS at workstation PRAA. AAS readings were taken at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train. Results are converted to ug/filter as K.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection AAS system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.5

T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: RMAAS	Unit Code	: 064819
Method Code	: 0905A1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Pet 500 mL Jar

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 768.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.923 at the full scale value.

INSTRUMENTATION:

Automated flow injection AAS system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

POTASSIUM - RMAAS

QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89

Lab: Atomic Absorption

Analytical Range: - to 5.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	90	4.00	3.978	-0.022	0.057
b :	90	1.00	0.998	-0.002	0.021
a+b :	90	5.00	4.976	-0.024	0.067
a-b :	90	3.00	2.980	-0.020	0.053
c :	90	1.00	0.998	-0.002	0.021
d :	90	0.25	0.250	0.000	0.009
c+d :	90	1.25	1.248	-0.002	0.027
c-d :	90	0.75	0.748	-0.002	0.018

s.d.(AB) Sw(within run): 0.037 S(between runs): 0.042 S/Sw:1.1

s.d.(CD) Sw(within run): 0.012 S(between runs): 0.016 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.770	-	5.230	for	A+B
2.850	-	3.150	for	A-B
1.175	-	1.325	for	C+D
0.700	-	0.800	for	C-D

DUPLICATES:

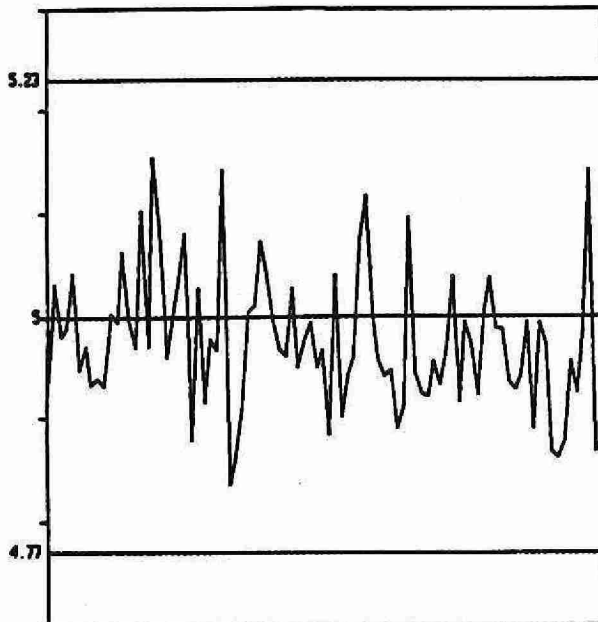
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
22	0.00	-	0.25	0.008	4.6
36	0.25	-	0.50	0.009	3.5
49	0.50	-	1.00	0.010	1.9
91	1.00	-	2.50	0.021	2.3
42	2.50	-	5.00	0.053	3.7
240	Overall			0.019	

OTHER CHECKS:

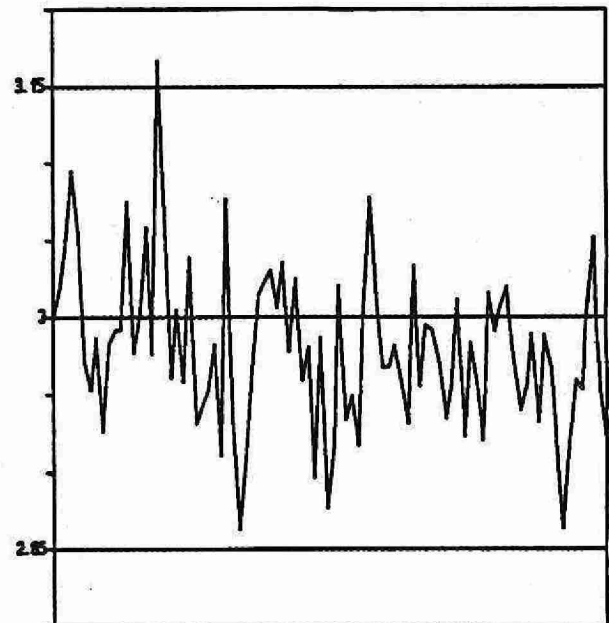
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	90	-0.001	0.0108
Absorbance	78	1.034	0.1073

POTASSIUM - RMAAS (MG/L AS K)

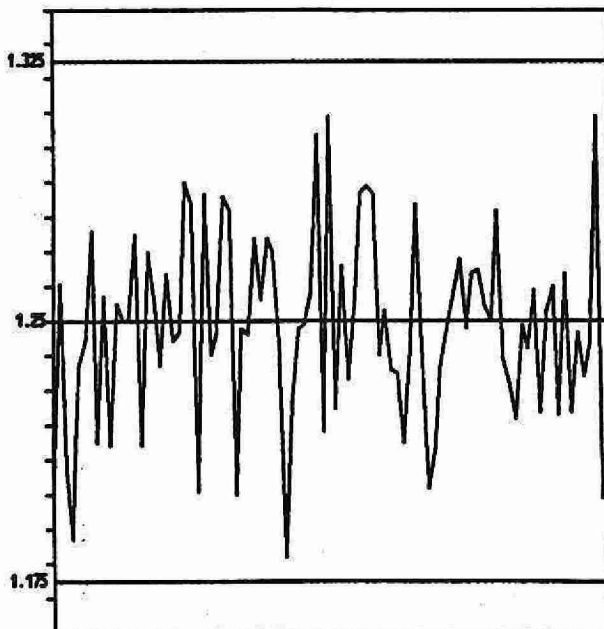
QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89



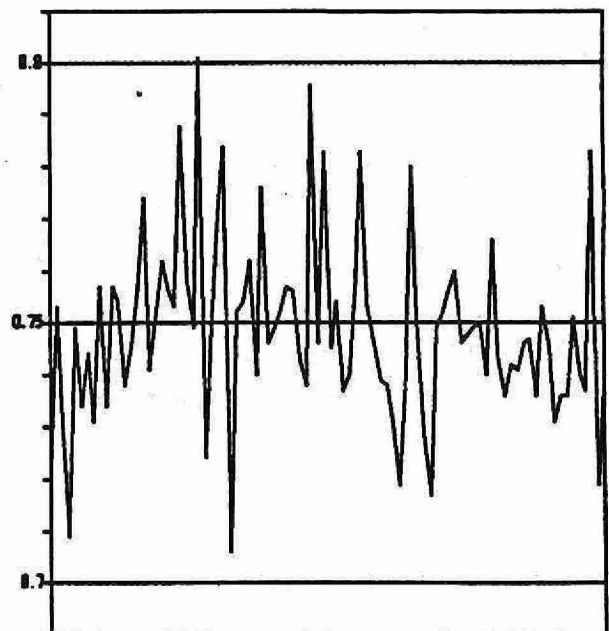
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: WAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: M. Young
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Pet 500 mL Jar

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at full scale level.

INSTRUMENTATION:

Automated flow injection AAS system

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 standards; 2 standards every 20 samples

MODIFICATIONS:

17/11/89 -Everex system 1800 microcomputer and software system introduced.

POTASSIUM - WAAS

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89

Lab: Atomic Absorption

Analytical Range: - to 25.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	80	20.00	19.95	-0.05	0.348
b :	80	5.00	5.01	0.01	0.122
a+b :	80	25.00	24.96	-0.04	0.396
a-b :	80	15.00	14.95	-0.05	0.340
c :	80	5.00	5.01	0.01	0.122
d :	80	1.25	1.26	0.01	0.052
c+d :	80	6.25	6.26	0.01	0.151
c-d :	80	3.75	3.75	0.00	0.111

s.d.(AB) Sw(within run): 0.24 S(between runs): 0.26 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.08 S(between runs): 0.09 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.8	-	26.3	for	A+B
14.2	-	15.8	for	A-B
5.65	-	6.85	for	C+D
3.33	-	4.15	for	C-D

DUPLICATES:

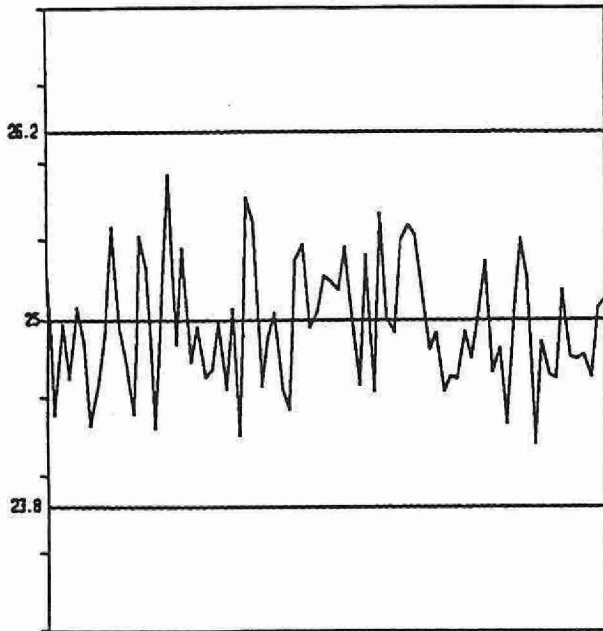
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
56	0.00	-	1.25	0.036	5.2
61	1.25	-	2.50	0.056	4.2
39	2.50	-	5.00	0.063	3.7
14	5.00	-	10.00	0.153	2.1
12	10.00	-	25.00	0.421	2.8
182	Overall			0.065	

OTHER CHECKS:

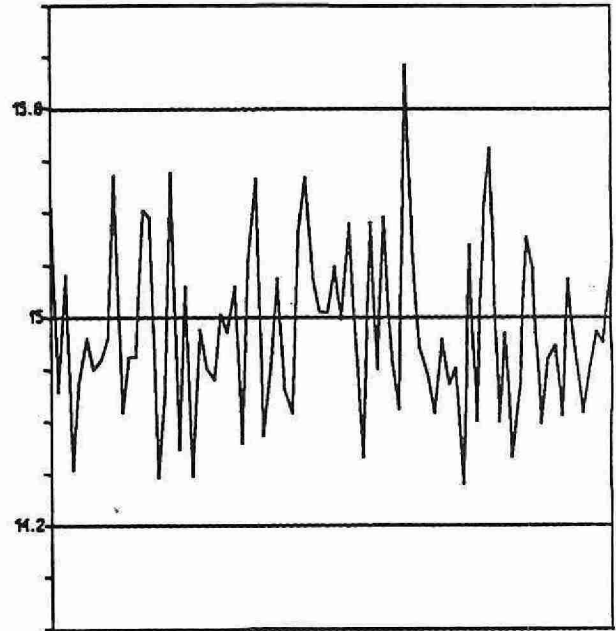
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	79	0.007	0.0305
Absorbance	76	1.125	0.0773

POTASSIUM - WAAS (MG/L AS K)

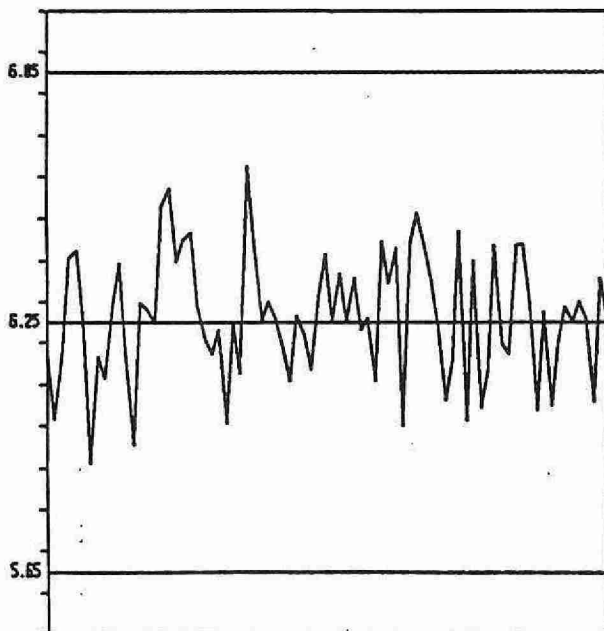
QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89



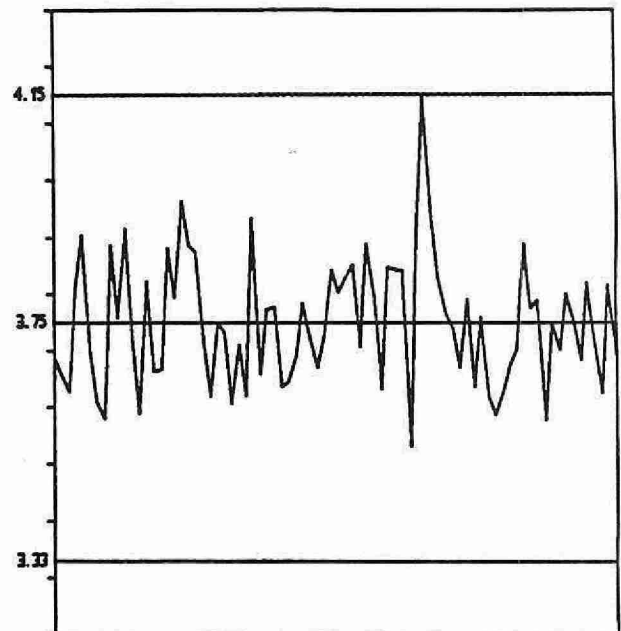
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** EXCHANGEABLE POTASSIUM - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: KKESC	Units	: meq/100 g
Work Station Code	: DOCAION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for K by AAS at 766.5 nm with an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level. N.B. Aluminum, calcium, and magnesium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally)
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown - average value used.

EXCHANGEABLE POTASSIUM - DOLOCATION

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89

Lab: Dorset Soils

Analytical Range: - to 0.75 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	28	0.56	0.564	0.004	0.010
b :	28	0.19	0.182	-0.008	0.008
a+b :	28	0.75	0.746	-0.004	0.013
a-b :	28	0.38	0.382	0.002	0.012

s.d.(AB) Sw(within run): 0.008 S(between runs): 0.009 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 - 0.84 for A+B
0.32 - 0.44 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	28	0.381	0.019
R2 :	28	0.151	0.015
R2 :	28	0.130	0.009

DUPLICATES:

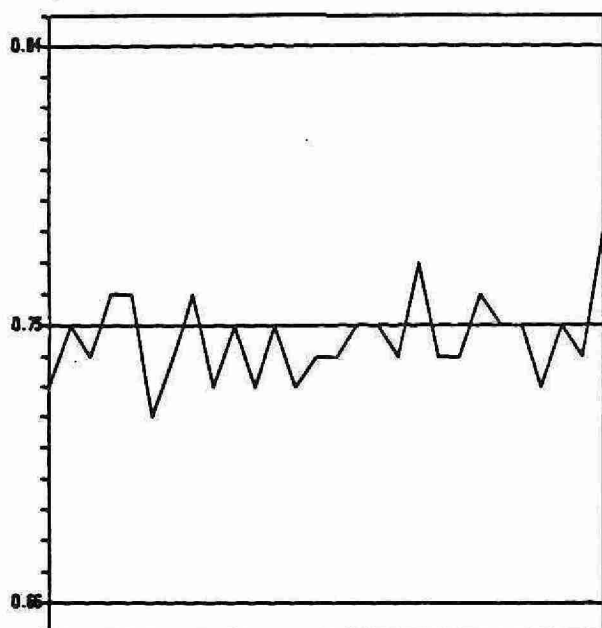
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
33	0.00 - 0.15	0.008	8.0
49	0.15 - 0.38	0.010	5.2
2	0.38 - 0.75	0.016	2.9
84	Overall	0.009	

OTHER CHECKS:

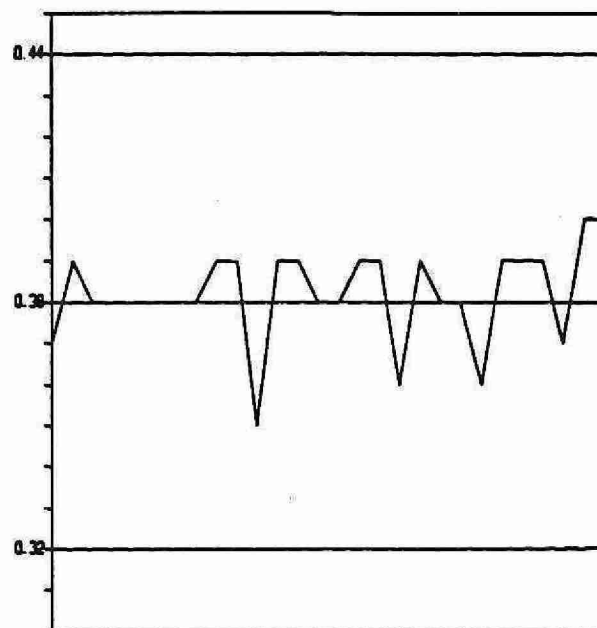
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	28	0	0

EXCHANGEABLE POTASSIUM - SOIL - LOCATION (MEQ/G)

QUALITY CONTROL DATA FROM 20/03/89 TO 19/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** SAND ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SAND	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 μ m) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of sand in the sample is determined by weighing the dried sieved fraction and expressing that as a percentage by weight of the total (sand, silt and clay) recovered.

INSTRUMENTATION:

- Sartorius 4 place digital balance (Handy)
- Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 1

T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery: 2 long term soil samples representing different soil types plus round robin ECSS samples (run occasionally).

SAND - DOPARTSZ

QUALITY CONTROL DATA FROM 10/04/89 TO 13/09/89

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Conc Measured	Standard(1) Deviation
R1 :	8	4.75	0.707
R2 :	9	53.89	3.180

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.0 - 20.0	N.A	N.A
6	20.0 - 50.0	1.73	5.4
2	50.0 - 100.0	0.50	0.6
9	Overall	1.43	

***** EXTRACTABLE SILICON - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: SIEOX	Units	: % by wt as Si
Work Station Code	: DOMETOX	Unit Code	: 070814
Method Code	: 302AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2 mm. A subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275

REPORTING:

Maximum Significant Figures: 2

Current W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three long term soil samples representing different soil types, 2 method blanks, 2 QC solutions at 25% and 75% of scale, round robin ECSS samples.

Drift: BL plus 1 standard (100% F.S.) every 10 samples.

EXTRACTABLE SILICON - DOMETOX

QUALITY CONTROL DATA FROM 05/01/89 TO 04/11/89

Lab: Dorset Soils

Analytical Range: - to 0.25 % as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	3	0.180	0.183	0.003	0.011
b :	3	0.060	0.063	0.003	0.006
a+b :	3	0.240	0.250	0.010	0.015
a-b :	3	0.120	0.120	0.000	0.010

s.d.(AB) Sw(within run): 0.007 S(between runs): 0.009 S/Sw: 1.29

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.05	0
R2 :	3	0.24	0.02
R3 :	3	0.18	0.006

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0	0

*** SILICON - REACTIVE SILICATES ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/02/75
LIS Test Name Code	: SIO3UR	Units	: mg/L as Si
Work Station Code	: ROM	Unit Code	: 064814
Method Code	: 001BC1	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents Domestic Water Supplies, Leachates		

SAMPLING:

Quantity Required	: 10 mL
Container	: PET 500 mL jar

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference.

Approximate absorbance: 0.7 at the full scale level.

Dissolved inorganic and dissolved organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 660 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA

Drift : BL every 10 samples; standards every 20 samples

NOTES:

Calibration standard is a hydrate: $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$.

SILICON-ROM

QUALITY CONTROL DATA FROM 03/01/89 TO 29/12/89

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	138	8.0	7.949	-0.049	0.070
b :	138	2.0	1.992	-0.008	0.039
a+b :	138	10.0	9.941	-0.059	0.092
a-b :	138	6.0	5.957	-0.043	0.065
c :	138	2.0	1.992	-0.008	0.039
d :	138	0.5	0.493	-0.007	0.022
c+d :	138	2.5	2.485	-0.015	0.054
c-d :	138	1.5	1.499	-0.001	0.033

s.d.(AB) Sw(within run): 0.05 S(between runs): 0.06 S/Sw: 1.22

s.d.(CD) Sw(within run): 0.02 S(between runs): 0.03 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.70	-	10.30	for	A+B
5.80	-	6.20	for	A-B
2.30	-	2.70	for	C+D
1.38	-	1.62	for	C-D

DUPLICATES:

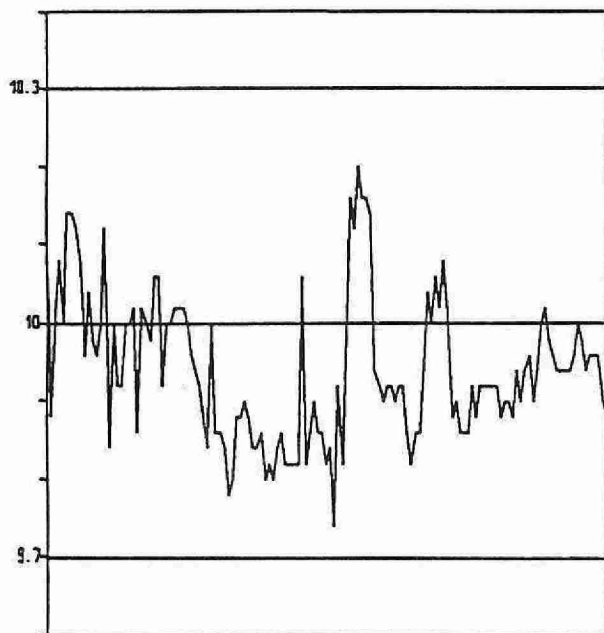
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
146	0.00	-	1.00	0.019	4.93
64	1.00	-	2.00	0.030	2.01
112	2.00	-	5.00	0.019	0.64
70	5.00	-	10.00	0.038	0.58
392	Overall			0.017	

OTHER CHECKS:

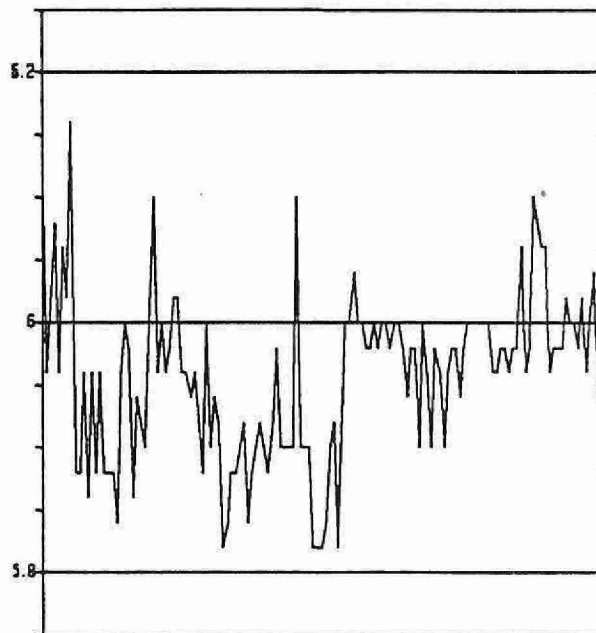
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	137	-0.009	0.018

SILICON - ROM (MG/L AS SI)

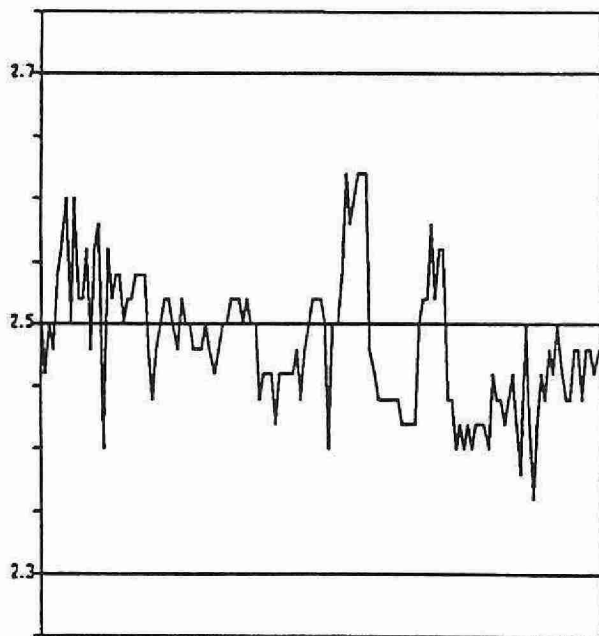
QUALITY CONTROL DATA FROM 03/01/89 TO 29/12/89



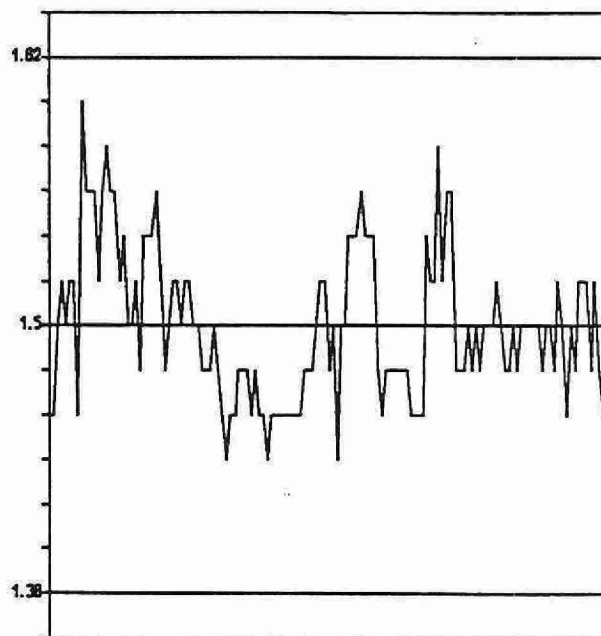
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** SILT *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SILT	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to < 2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (> 53 μ m) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of silt in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (Handy)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery: 2 long term soil samples representing different soil types plus a round robin ECSS sample (run occasionally).

SILT - DOPARTSZ

QUALITY CONTROL DATA FROM 10/04/89 TO 13/09/89

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Conc Measured	Standard(1) Deviation
R1 :	9	42.89	3.79
R2 :	9	44.55	3.36

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.0 - 20.0	1.34	6.5
5	20.0 - 50.0	0.91	1.5
3	50.0 - 100.0	1.14	
9	Overall		

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAA	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: M. Young
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required : 5 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated flow injection modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

27/11/89 - Analytical System switched to SpectrAA-400, an automated AAS with an IBM PC/2 Model 30 computer to provide instrument control, data processing and mainframe communications, with BL plus 5 standards

SODIUM - PRAA

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89

Lab: Atomic Absorption

Analytical Range: - to 1.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	76	0.60	0.597	-0.003	0.008
b :	76	0.10	0.101	0.001	0.004
a+b :	76	0.70	0.699	-0.001	0.009
a-b :	76	0.50	0.496	-0.004	0.009

s.d.(AB) Sw(within run): 0.006 S(between runs): 0.006 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 - 0.75 for A+B
0.47 - 0.53 for A-B

DUPLICATES:

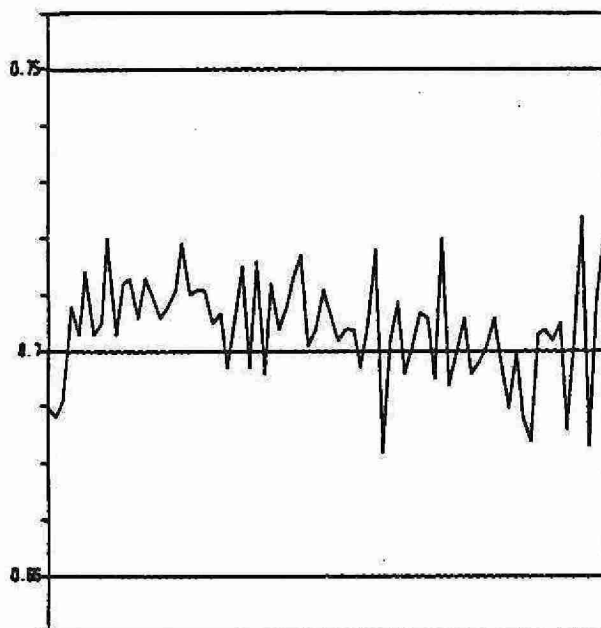
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
150	0.00 - 0.10	0.002	7.2
28	0.10 - 0.20	0.003	2.1
17	0.20 - 0.50	0.005	1.4
6	0.50 - 1.00	0.012	1.8
201	Overall	0.002	

OTHER CHECKS:

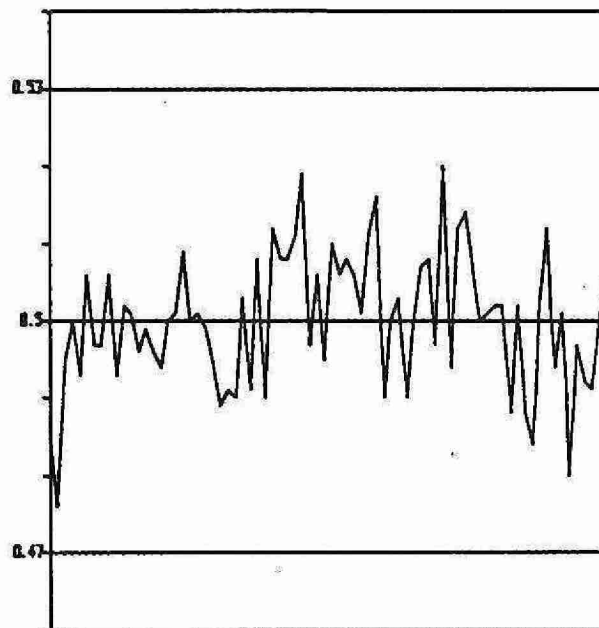
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	76	0.0005	0.0019

SODIUM - PRAA (MG/L AS Na)

QUALITY CONTROL DATA FROM 13/01/89 TO 26/11/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Pet 500 mL Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated flow injection modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

MODIFICATIONS:

20/11/89 - Analytical System switched to SpectrAA-400, an automated AAS with an IBM PC/2 Model 30 computer to provide instrument control, data processing and mainframe communications, with BL plus 5 standards

SODIUM - PRAAS

QUALITY CONTROL DATA FROM 18/01/89 TO 28/12/89

Lab: Atomic Absorption

Analytical Range: - to 4.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	62	3.2	3.196	-0.004	0.038
b :	62	0.8	0.801	-0.001	0.017
a+b :	62	4.0	3.998	-0.002	0.048
a-b :	62	2.4	2.395	-0.005	0.034
c :	62	0.8	0.801	0.001	0.017
d :	62	0.2	0.198	-0.002	0.012
c+d :	62	1.0	1.000	0.000	0.025
c-d :	62	0.6	0.603	0.003	0.017

s.d.(AB) Sw(within run): 0.024 S(between runs): 0.030 S/Sw:1.2

s.d.(CD) Sw(within run): 0.011 S(between runs): 0.015 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.82	-	4.18	for	A+B
2.28	-	2.52	for	A-B
0.82	-	1.18	for	C+D
0.48	-	0.72	for	C-D

DUPLICATES:

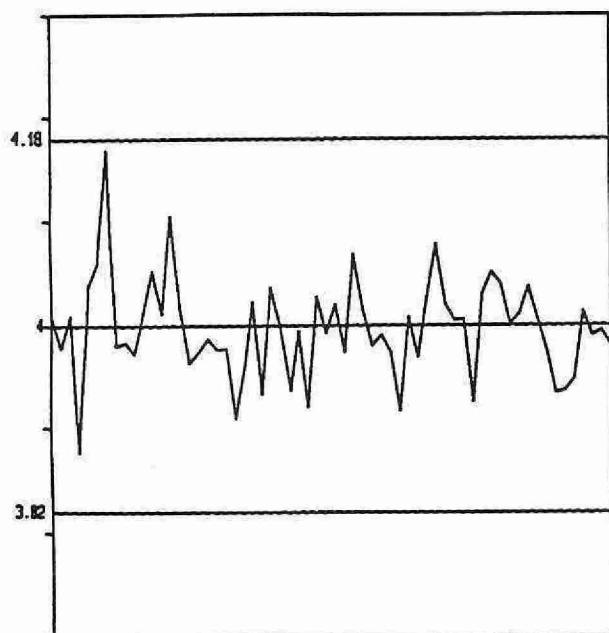
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
26	0.00 - 0.60	0.0052	1.3
60	0.60 - 1.00	0.0142	2.1
41	1.00 - 2.00	0.0151	2.0
23	2.00 - 3.00	0.0217	1.2
12	3.00 - 4.00	0.0310	1.4
162	Overall	0.0145	

OTHER CHECKS:

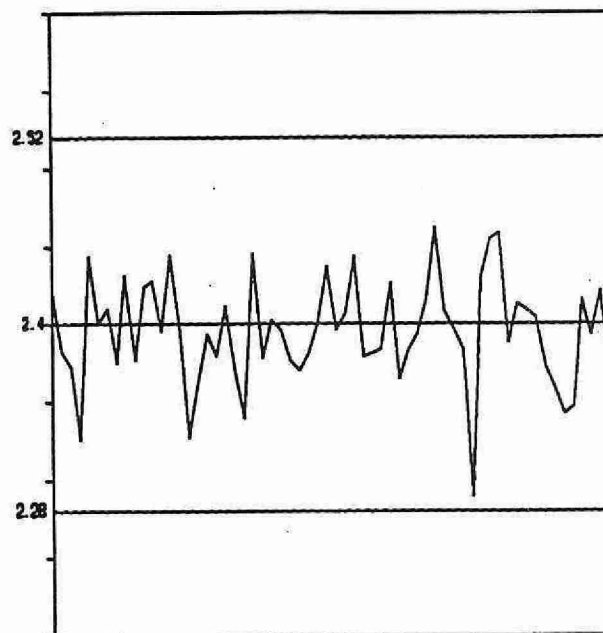
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	62	0.001	0.0045
Absorbance	59	1.083	0.2019

SODIUM - PRAAS (MG/L AS Na)

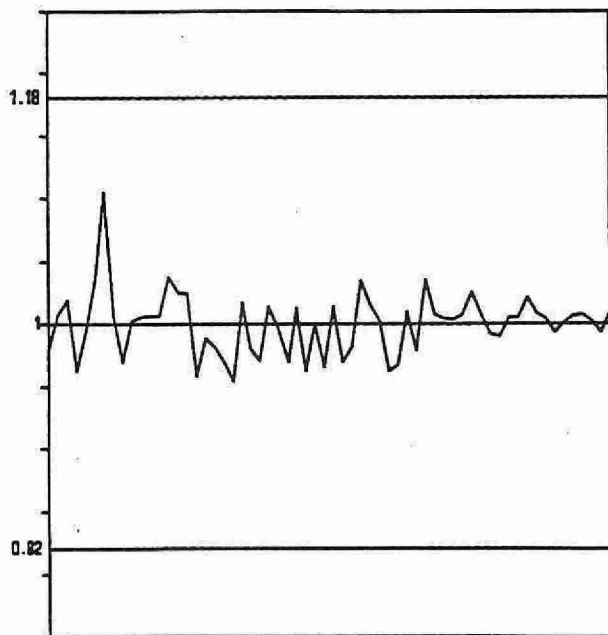
QUALITY CONTROL DATA FROM 18/01/89 TO 28/11/89



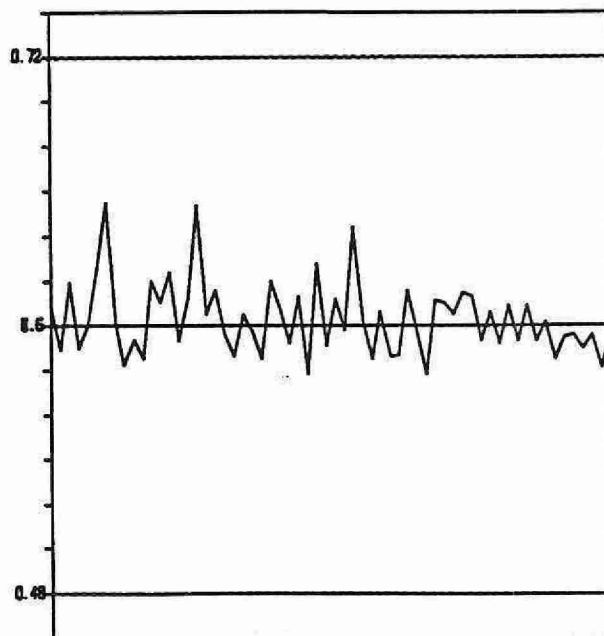
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: NAUR	Units	: ug/Filter as Na
Work Station Code	: PRLOV	Unit Code	: 361811
Method Code	: 004AA3	Supervisor	: M. Young
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples were analyzed by AAS at workstation PRAA. AAS readings were taken at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train. Results are converted to ug/filter as Na. Potassium is determined on the same extract. Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection AAS system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards.

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: RMAAS	Unit Code	: 064811
Method Code	: 0905A1	Supervisor	: M. Young
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Pet 500 mL Jar

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.

Approximate absorbance: 1.16 at the full scale value.

INSTRUMENTATION:

Automated flow injection AAS system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

SODIUM - RMAAS

QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89

Lab: Atomic Absorption

Analytical Range: - to 20.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	91	16.0	15.93	-0.07	0.190
b :	91	4.0	4.00	0.00	0.089
a+b :	91	20.0	19.92	-0.08	0.237
a-b :	91	12.0	11.93	-0.07	0.177
c :	91	4.0	4.00	0.00	0.089
d :	91	1.0	1.00	0.00	0.035
c+d :	91	5.0	4.99	-0.01	0.108
c-d :	91	3.0	3.00	0.00	0.083

s.d.(AB) Sw(within run): 0.12 S(between runs): 0.15 S/Sw: 1.2

s.d.(CD) Sw(within run): 0.06 S(between runs): 0.07 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.4	-	20.6	for	A+B
11.6	-	12.4	for	A-B
4.7	-	5.3	for	C+D
2.8	-	3.2	for	C-D

DUPLICATES:

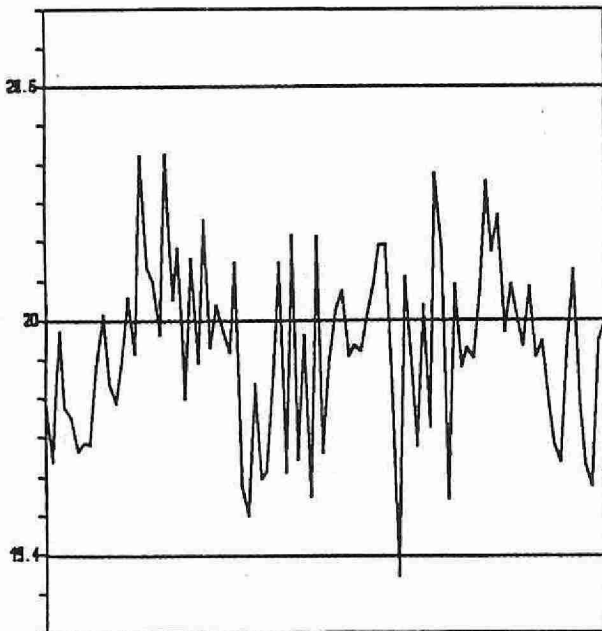
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
65	0.00	- 1.00	0.032	6.1
27	1.00	- 2.00	0.040	2.8
52	2.00	- 5.00	0.051	1.8
42	5.00	- 10.00	0.091	1.3
27	10.00	- 20.00	0.252	2.3
213	Overall		0.066	

OTHER CHECKS:

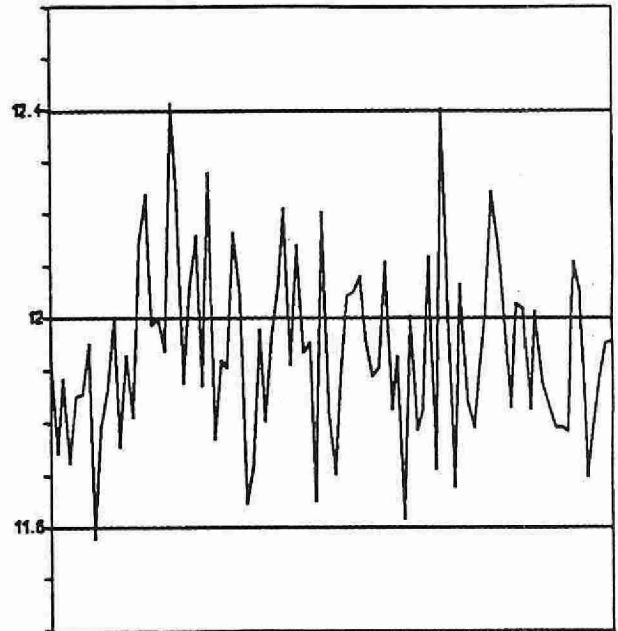
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	90	0.003	0.0183
Absorbance	83	1.138	0.0610

SODIUM - RMAAS (MG/L AS Na)

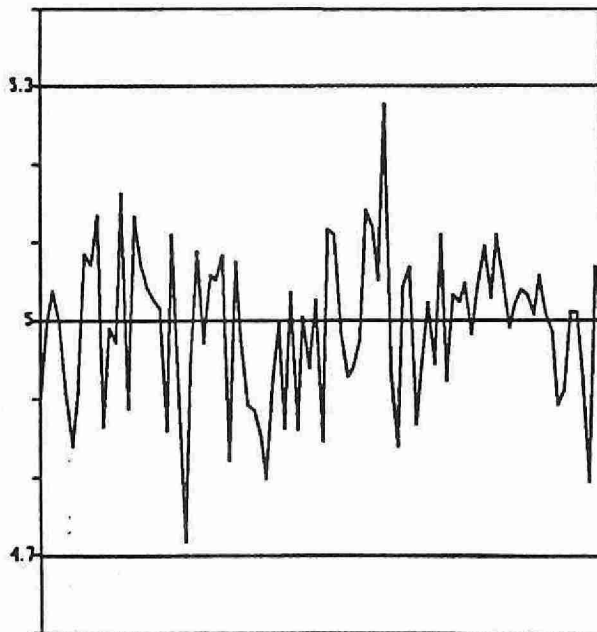
QUALITY CONTROL DATA FROM 10/01/89 TO 28/12/89



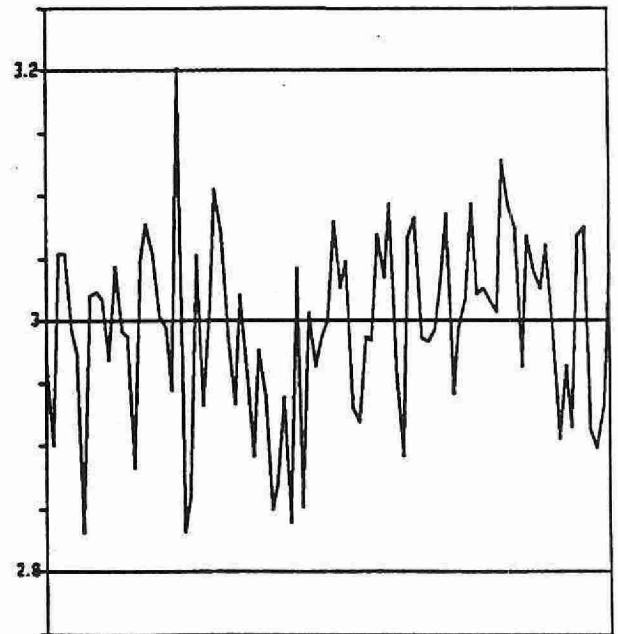
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: WAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: M. Young
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Pet 500 mL Jar

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.

Approximate absorbance: 1.21 at the full scale level.

INSTRUMENTATION:

Automated flow injection AAS system

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/11/89 -Everex system 1800 microcomputer and software system introduced.

SODIUM - WAAS

QUALITY CONTROL DATA FROM 09/01/89 TO 27/12/89

Lab: Atomic Absorption

Analytical Range: - to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	150	80.0	79.89	-0.11	1.092
b :	150	20.0	19.96	-0.04	0.387
a+b :	150	100.0	99.85	-0.15	1.257
a-b :	150	60.0	59.94	-0.06	1.052
c :	150	20.0	19.96	-0.04	0.387
d :	150	5.0	5.03	0.03	0.167
c+d :	150	25.0	24.98	-0.02	0.469
c-d :	150	15.0	14.93	-0.07	0.367

s.d.(AB) Sw(within run): 0.74 S(between runs): 0.82 S/Sw: 1.1

s.d.(CD) Sw(within run): 0.26 S(between runs): 0.30 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.50	-	104.50	for	A+B
57.00	-	63.00	for	A-B
22.75	-	27.75	for	C+D
13.50	-	16.50	for	C-D

DUPLICATES:

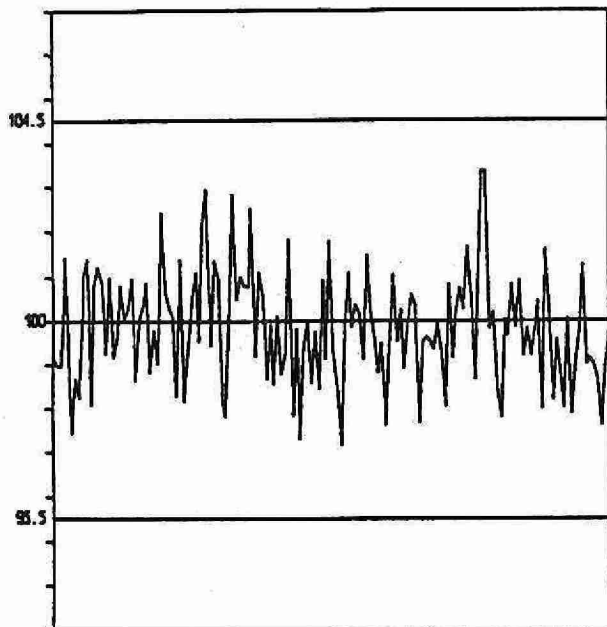
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
72	0.0	-	5.0	0.163	5.5
80	5.0	-	10.0	0.168	2.3
124	10.0	-	25.0	0.259	1.8
50	25.0	-	50.0	0.747	2.5
38	50.0	-	100.0	0.862	1.3
364	Overall			0.305	

OTHER CHECKS:

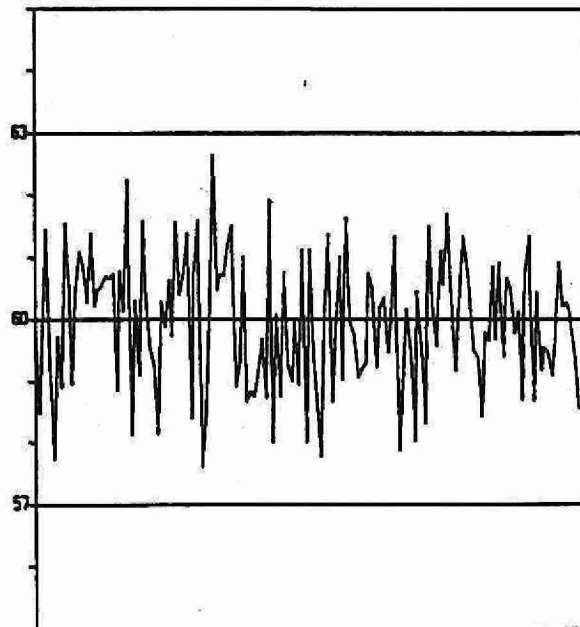
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	149	-0.017	0.1057
Absorbance	137	1.169	0.0644

SODIUM - WAAS (MG/L AS Na)

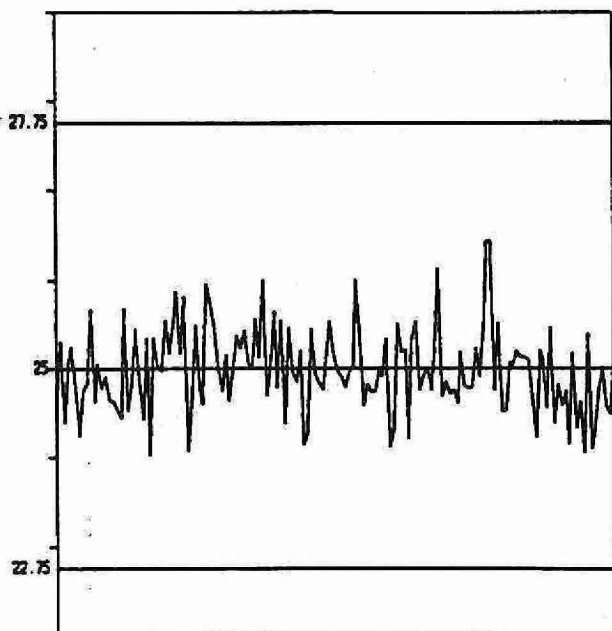
QUALITY CONTROL DATA FROM 09/01/89 TO 27/12/89



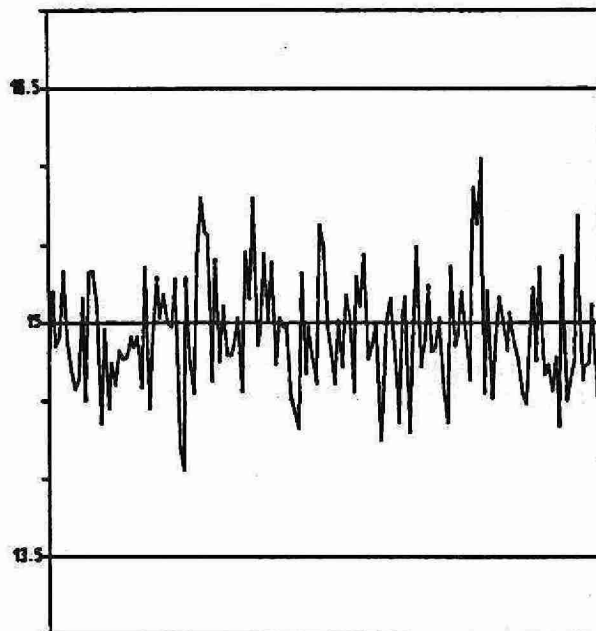
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** SOLIDS - DISSOLVED *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 106AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Surface Waters, Leachates		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH glass fibre filter. 50 or 100 mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103-105°C; and stored in a desiccator for at least 24 hours. After reweighing the dish the dissolved solids content is calculated by subtracting the original dish mass from the dried dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), drying oven, suction filtration apparatus, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Recovery	: LTBL plus 2 standards, e.g. R1
Drift	: Balance zero is checked every 10 dishes.

NOTES:

Correction factor for dish tare weights is included in the calculation, based on variations of a standard sealed vessel.
As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are the same used for Total Solids. Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS DISSOLVED - SOLIDS

QUALITY CONTROL DATA FROM 09/01/89 TO 28/12/89

Lab: Solids and BOD

Analytical Range: - to 3000 mg/L

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	52	2000.0	1996.9	19.52
R2 :	52	500.0	497.0	12.93

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
10	0 - 200	6.60	5.7
59	200 - 600	14.99	3.9
20	600 - 1000	19.38	3.0
21	1000 - 3000	26.75	1.7
110	Overall	16.72	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Blank	58	1.65	3.343

***** SOLIDS - IGNITED *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RSFA,RSPA,RSTA	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 107AB4,207AB5,507AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required : 5-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for dissolved, particulate, or total solids is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The ignited or ash weight is obtained as the difference between the final ignited weight and the original dish or filter weight. Similarly the volume used in the ignited calculations is the volume selected for the original dried solids measurement. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), muffle furnace, ceramic dishes, Petri dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2,0.5,2 T value: 10,2.5,10

CONTROLS:

Calibration : 4 S class weights, e.g. QCA
Drift : Balance zero is checked at least every 20 dishes.

NOTES:

In the order listed above, W and T values refer to the residual ash after ignition of the dried residual from dissolved, particulate, and total solids determinations.
Duplicate data refer to ash residuals rather than loss on ignition.
Detection criteria estimates are unreliable due to limited data; samples requiring these tests are usually sewage sludges with high solids contents.
As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are the same as that listed under Total Solids.
Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory

***** SOLIDS - PARTICULATE *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RSP	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 206AB5	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents and Surface Waters		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (5 to 500 mL) is pipetted or quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The graduated cylinder and then the filter are washed with a total of 30 mL distilled water. The filter is dried at 103-105°C, and suspended solids content is calculated by subtracting the original filter mass from the dried filter mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5-decimal places), drying oven, suction filtration apparatus
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA for each balance (results in grams)
Recovery	: LTBL plus 2 standards, e.g. R1
Drift	: Balance zero is checked every tenth weighing.
Blank	: Filter washed with 500 mL distilled water;

NOTES:

A standard correction factor was applied to all filters to account for weight loss during filtering (-0.0003g). QC data were obtained from two balances. Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS PARTICULATE - SOLIDS

QUALITY CONTROL DATA FROM 05/01/89 TO 17/12/89

Lab: Solids and BOD

Analytical Range: - to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	161	0.50	0.499969	-0.000030	0.000020
b :	161	0.05	0.049978	-0.000021	0.000023
a+b :	161	0.55	0.549948	-0.000051	0.000038
a-b :	161	0.45	0.449990	-0.000009	0.000020

s.d.(AB) Sw(within run): 0.000014 S(between runs): 0.000021 S/Sw: 1.47

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54984 - 0.55016 for A+B
0.44989 - 0.45011 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	132	187.0	193.1	4.84
R2 :	130	47.2	48.7	2.54

DUPLICATES:

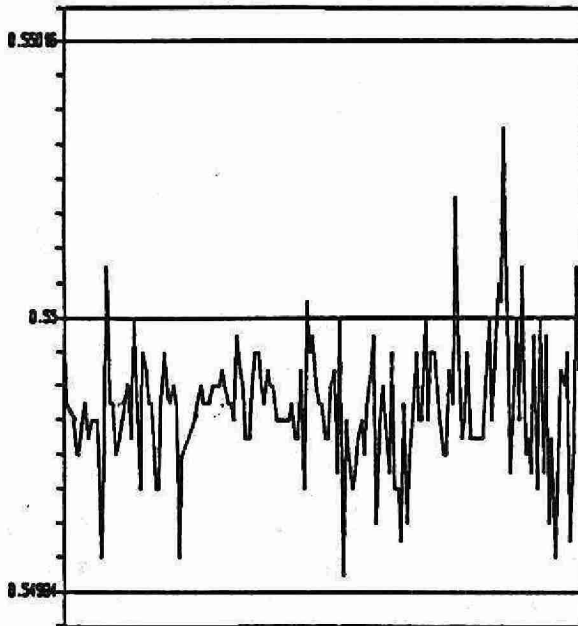
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
121	0.0	- 25.0	1.07	17.9
31	25.0	- 50.0	1.87	6.5
59	50.0	- 150.0	4.57	5.9
30	150.0	- 500.0	12.94	5.4
18	500.0	- 3000.0	57.48	5.7
259	Overall		3.36	

OTHER CHECKS:

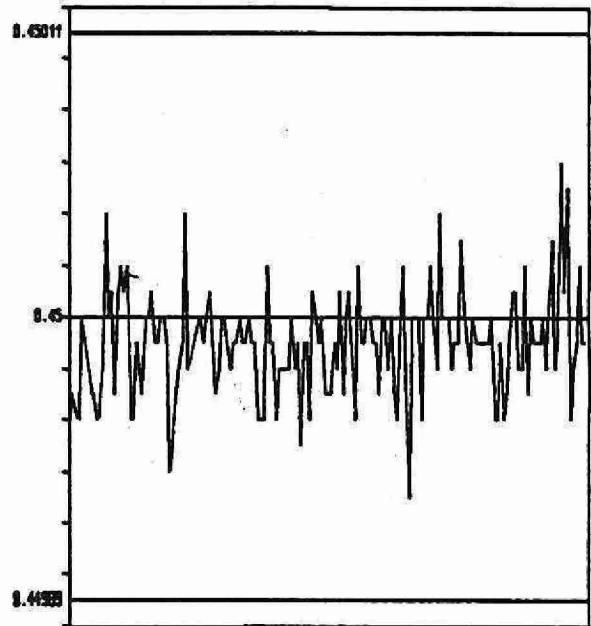
	Number of Data	Data Mean	Standard(1) Deviation
Blank	147	0.213	0.3155

SOLIDS - PARTICULATE SOLIDS (MG/L)

QUALITY CONTROL DATA FROM 05/01/89 TO 17/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** SOLIDS - TOTAL *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RST	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 506AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents, Sludge		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

A 50.0 or 100 mL aliquot of sample is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing, the total residue or solids content is calculated by subtracting the original dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), drying oven, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA (results in grams)
Recovery	: BL plus 2 standards, e.g. R1
Drift	: Balance zero is checked every tenth weighing

NOTES:

Correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in the calculation. QC data were obtained from two balances. Currently tests on sewage are performed by a private laboratory. QC results reported here only tests performed at the Central Laboratory.

SOLIDS-TOTAL - SOLIDS

QUALITY CONTROL DATA FROM 04/01/89 TO 20/12/89

Lab: Solids and BOD

Analytical Range: - to 60,000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	83	50.00	50.00024	0.00024	0.00011
b :	83	30.00	29.99994	-0.00006	0.00013
a+b :	83	80.00	80.00018	0.00018	0.00021
a-b :	83	20.00	20.00029	0.00029	0.00011

s.d.(AB) Sw(within run): 0.00008 S(between runs): 0.00012 S/Sw: 1.47

On any given day the calibration is accepted if the values obtained lie within the ranges:

79.9994 - 80.0006 for A+B
19.9994 - 20.0006 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	68	20000.0	20027.8	70.9
R2 :	68	2000.0	1997.5	15.2

DUPLICATES:

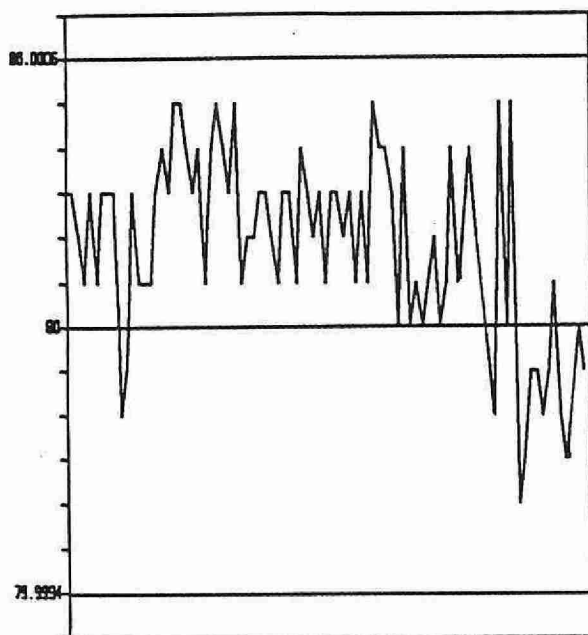
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0 - 100	4.67	7.3
58	100 - 500	13.94	4.6
49	500 - 2000	15.78	2.1
7	2000 - 10,000	67.46	2.1
0	10,000 - 60,000	N.A	N.A
126	Overall	14.23	

OTHER CHECKS:

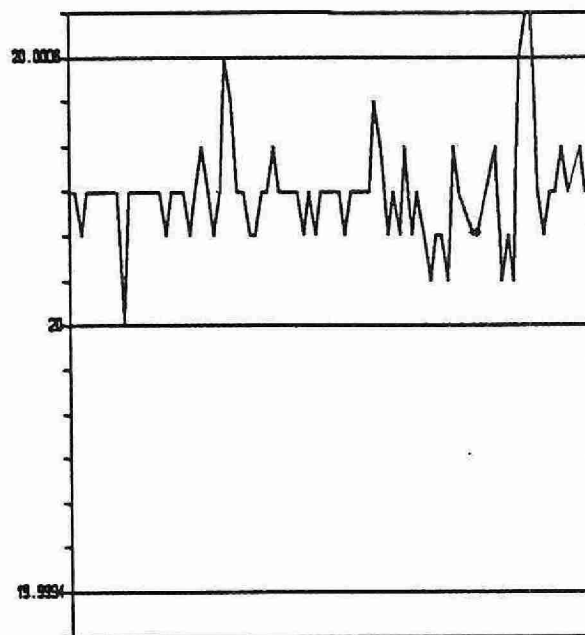
	Number of Data	Data Mean	Standard(1) Deviation
Blank	71	-0.052	5.042

SOLIDS - TOTAL SOLIDS (MG/L)

QUALITY CONTROL DATA FROM 04/01/89 TO 20/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** WATER EXTRACTABLE SULPHATE - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SSO4EW	Units	: ug/g as SO ₄
Work Station Code	: DOANIONX	Unit Code	: 073941
Method Code	: 301AI5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 10 g air dried
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Five grams of sample is agitated for 60 minutes with 25 mL deionized water. Samples are centrifuged and the supernatant is filtered through a 0.45 um membrane filter. Sulphate is determined on the filtrate by ion chromatography.

INSTRUMENTATION:

- Waters Model 430 Conductivity Detector
- Spectroflow 400 solvent delivery system
- Spectro-Physics SP780 XR autosampler
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 6 standards; 2 QC solutions at 25% and 75% of full scale.

CONTROLS:

Calibration : 2 method BL plus 2 standards, e.g. QCA
Recovery : 2 long term soil samples representing different soil types
Drift : 100% full scale standard every 10 samples

WATER EXTRACTABLE SULPHATE - DOANIONX

QUALITY CONTROL DATA FROM 23/05/89 TO 16/10/89

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	14	75.00	73.54	-1.46	1.34
b :	14	36.00	35.89	-0.11	1.22
a+b :	14	111.00	109.42	-1.58	2.14
a-b :	14	39.00	37.65	-1.35	1.42

s.d.(AB) Sw(within run): 1.00 S(between runs): 1.28 S/Sw: 1.28

On any given day the calibration is accepted if the values obtained lie within the ranges:

103.5 - 118.5 for A+B
34.0 - 44.0 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	13	16.08	2.26
R2 :	13	53.63	4.04
R3 :	7	5.0	2.22

DUPLICATES:

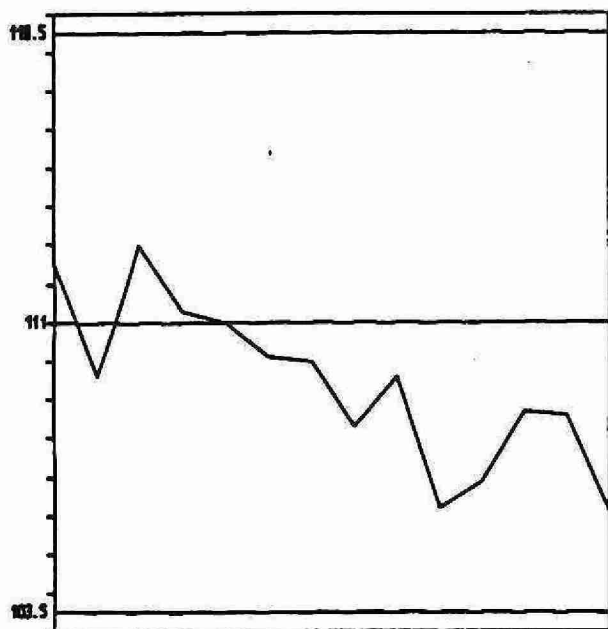
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
18	0.0 - 20.0	0.93	6.4
20	20.0 - 50.0	2.53	8.5
2	50.0 - 100.0	3.02	3.9
40	Overall	1.94	

OTHER CHECKS:

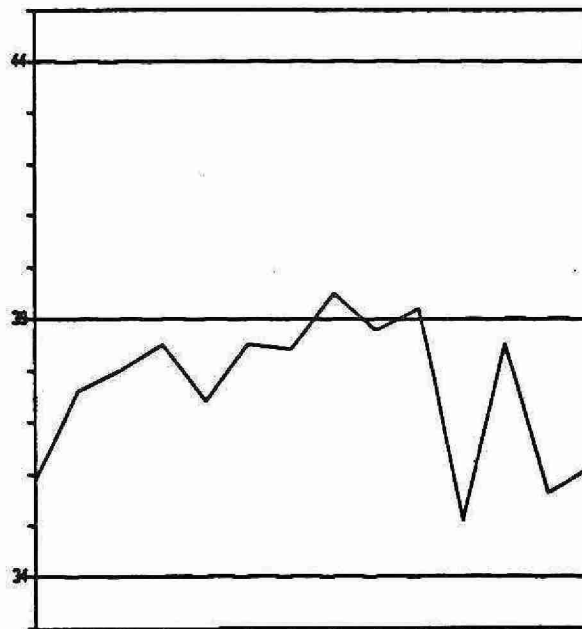
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	14	0.250	0.670

WATER EXTRACTABLE SULPHATE - SOIL - DOANIOX

QUALITY CONTROL DATA FROM 23/05/89 TO 16/10/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO4FR,SSO4NF	Units	: ug/Filter as SO ₄
Work Station Code	: PRSEQ	Unit Code	: 361941
Method Code	: 004AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Nylon (SSO4NF) filters from LoVol and sequential filter packs, and Teflon (SSO4FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as SO₄. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE - PRSEQ - (SS04FR)

QUALITY CONTROL DATA FROM 12/01/89 TO 28/12/89

Lab: Ion Chromatography

Analytical Range: - to 250 ug/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	125	200	200.4	0.4	2.1
b :	125	50	49.8	-0.2	0.9
a+b :	125	250	250.2	0.2	2.4
a-b :	125	150	150.5	0.5	2.2

s.d.(AB) Sw(within run): 1.56 S(between runs): 1.63 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

239 - 261 for A+B
143 - 157 for A-B

DUPLICATES:

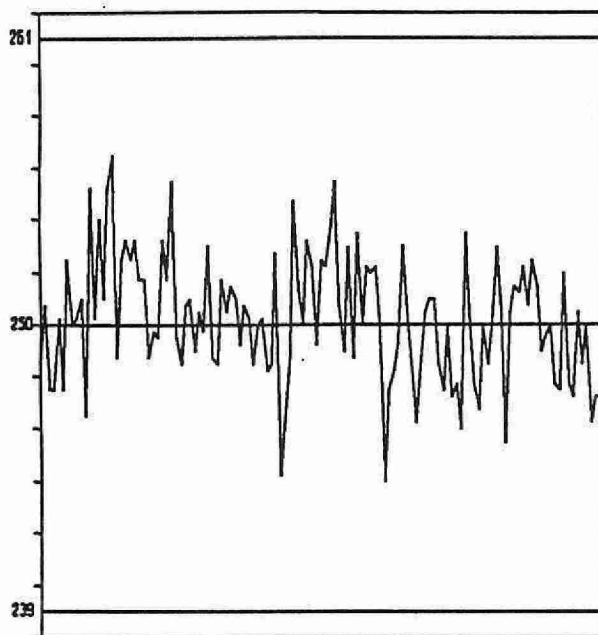
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
94	0.0 - 25.0	0.46	4.6
70	25.0 - 50.0	0.78	2.1
89	50.0 - 125.0	1.00	1.5
54	125.0 - 250.0	1.59	0.9
307	Overall	0.85	

OTHER CHECKS:

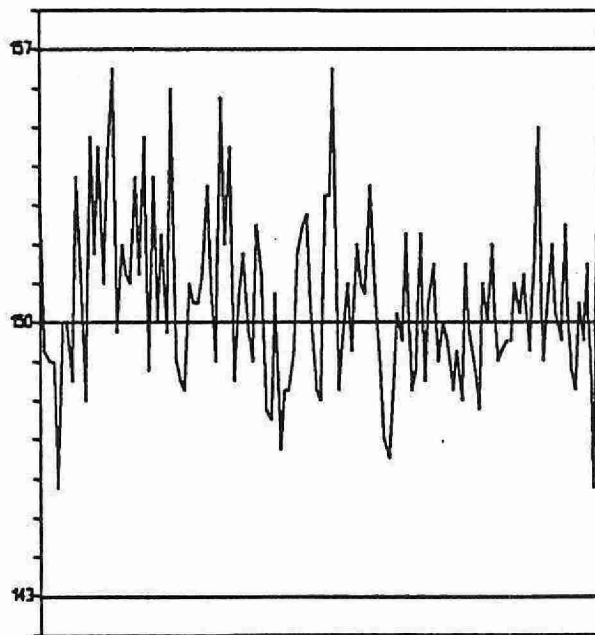
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	125	0.276	0.784

SULPHATE - PRSEQ-(SSO4FR) (UG/FILTER AS SO4)

QUALITY CONTROL DATA FROM 12/01/89 TO 28/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

SULPHATE - PRSEQ - (SS04NF)

QUALITY CONTROL DATA FROM 12/01/89 TO 21/12/89

Lab: Ion Chromatography

Analytical Range: - to 250 ug/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	104	200.0	200.2	0.2	2.3
b :	104	50.0	50.0	0.0	1.2
a+b :	104	250.0	250.2	0.2	2.7
a-b :	104	150.0	150.2	0.2	2.5

s.d.(AB) Sw(within run): 1.77 S(between runs): 1.83 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

239 - 261 for A+B
143 - 157 for A-B

DUPLICATES:

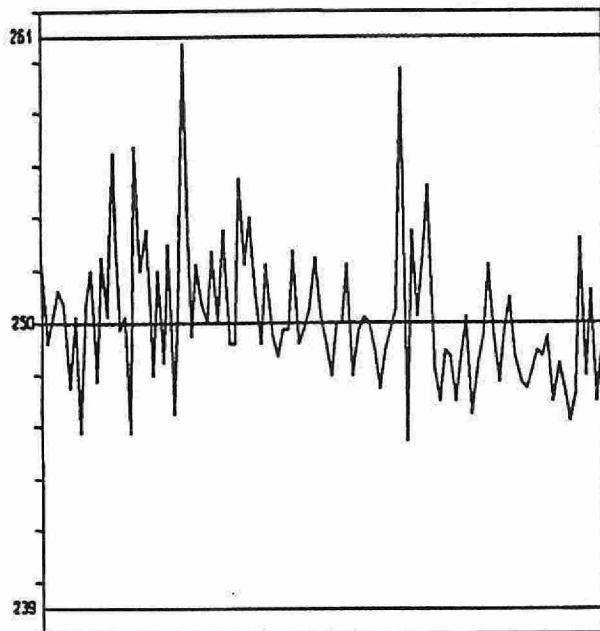
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
100	0 - 25	0.54	5.7
55	25 - 50	0.76	2.4
27	50 - 250	1.17	1.1
182	Overall	0.78	

OTHER CHECKS:

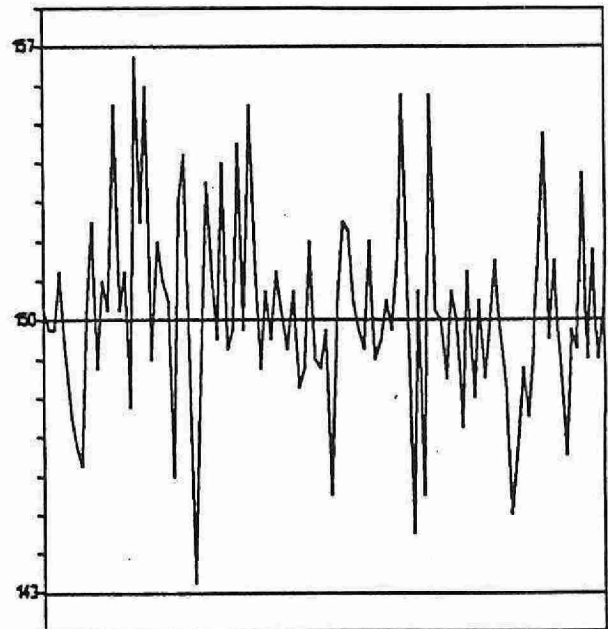
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	104	0.1466	0.5209

SULPHATE - PRSEQ (SSO4NF) (UG/FILTER AS SO4)

QUALITY CONTROL DATA FROM 12/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: PRIC1	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

SULPHATE - PRIC1

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89

Lab: Ion Chromatography

Analytical Range: - to 10.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	108	8.0	8.003	0.003	0.116
b :	108	2.0	1.982	-0.018	0.074
a+b :	108	10.0	9.979	-0.021	0.141
a-b :	108	6.0	6.014	0.014	0.134

s.d.(AB) Sw(within run): 0.094 S(between runs): 0.097 S/Sw: 1.029

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.4 - 10.6 for A+B
5.6 - 6.4 for A-B

DUPLICATES:

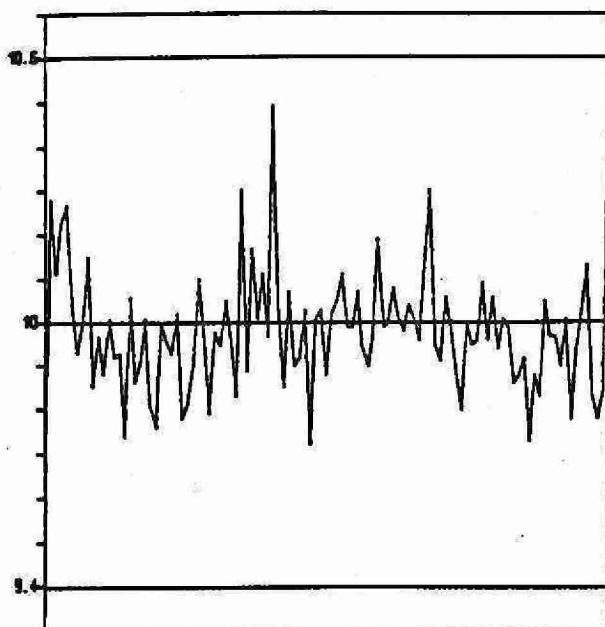
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
29	0.0 - 1.0	0.019	4.1
19	1.0 - 2.0	0.037	2.1
82	2.0 - 5.0	0.078	3.3
119	5.0 - 10.0	0.138	2.2
249	Overall	0.096	

OTHER CHECKS:

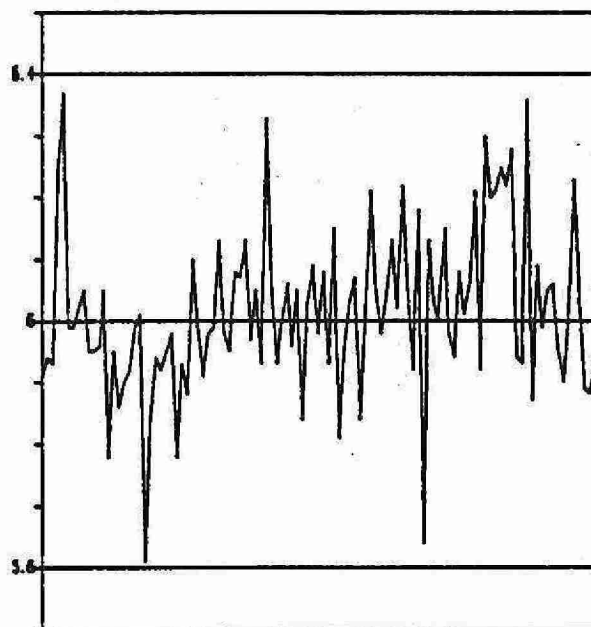
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	90	0.0872	0.0818

SULPHATE - PRIC1 (MG/L AS SO4)

QUALITY CONTROL DATA FROM 05/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: ug/Filter as SO ₄
Work Station Code	: PRLOV	Unit Code	: 361941
Method Code	: 004AIC	Supervisor	: F. Lo
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as SO₄. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing

REPORTING:

Maximum Significant Figures: 3

Current W value: 1.0

T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE - PRLOV

QUALITY CONTROL DATA FROM 17/01/89 TO 21/12/89

Lab: Ion Chromatography

Analytical Range: - to 500 ug/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	31	400	400.2	0.2	4.0
b :	31	100	98.0	-2.0	9.0
a+b :	31	500	498.2	-2.0	10.4
a-b :	31	300	302.3	2.3	9.3

s.d.(AB) Sw(within run): 6.61 S(between runs): 6.98 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

478 - 522 for A+B
285 - 315 for A-B

DUPLICATES:

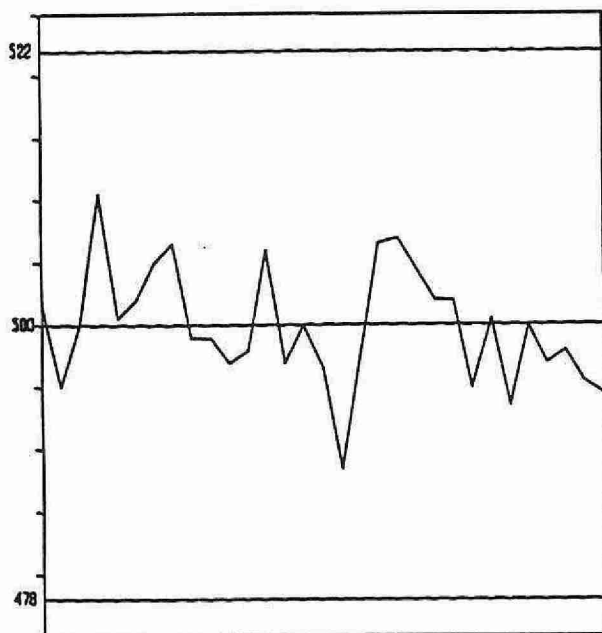
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0 - 100	1.33	4.3
13	100 - 250	2.19	1.2
12	250 - 500	2.59	1.4
34	Overall	2.09	1.7

OTHER CHECKS:

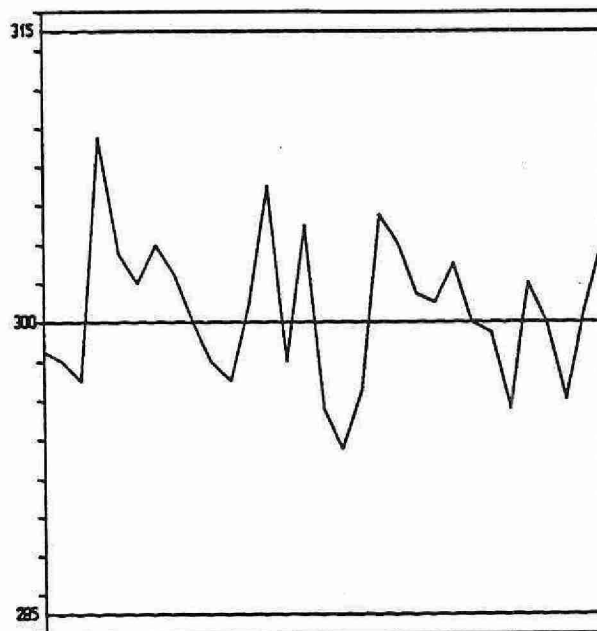
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	31	0.419	1.361

SULPHATE - PRLOV (UG/FILTER AS SO4)

QUALITY CONTROL DATA FROM 17/01/89 TO 21/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/82
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: RMDSO4	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Domestic Waters, Leachates, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic bottle

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the samples by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO₄ is determined by comparison of the sample scan to a series of standard scans.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

SULPHATE - RMDS04

QUALITY CONTROL DATA FROM 06/01/89 TO 22/12/89

Lab: Ion Chromatography

Analytical Range: - to 100.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	92	80.0	80.5	0.5	0.70
b :	92	20.0	19.7	-0.3	0.55
a+b :	92	100.0	100.1	0.1	0.84
a-b :	92	60.0	60.8	0.8	0.94

s.d.(AB) Sw(within run): 0.66 S(between runs): 0.63 S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.4 - 103.6 for A+B
57.6 - 62.4 for A-B

DUPLICATES:

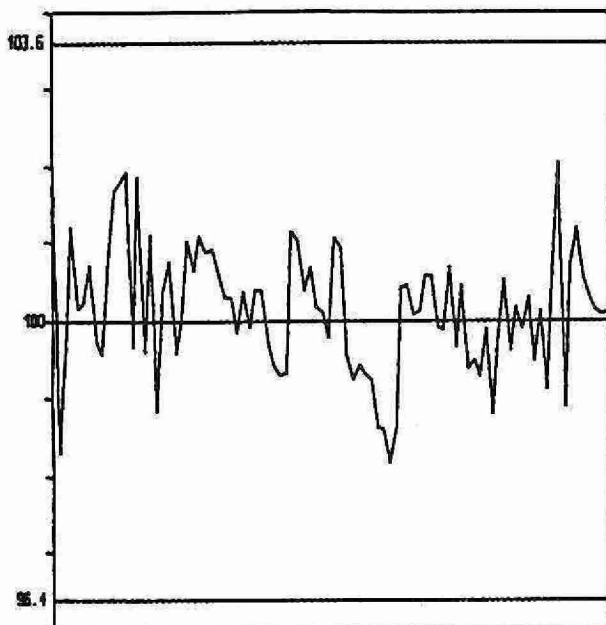
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
102	0.0	-	20.0	0.30	4.9
95	20.0	-	50.0	0.63	2.9
28	50.0	-	100.0	0.84	1.9
225	Overall			0.46	

OTHER CHECKS:

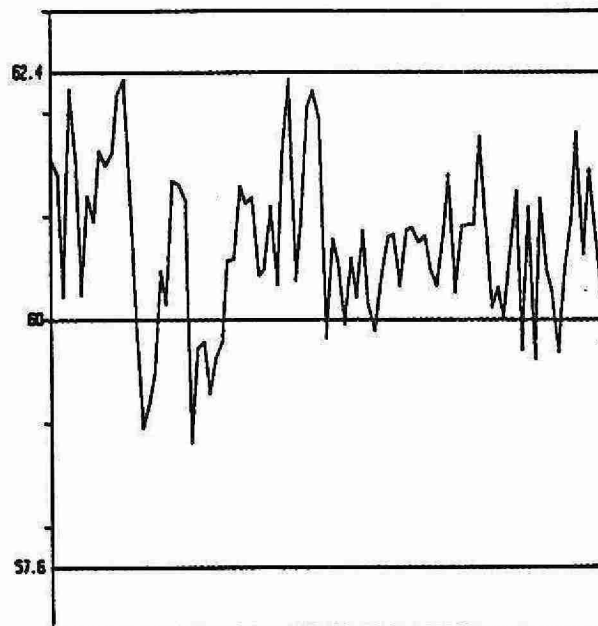
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	72	0.049	0.0047

SULPHATE - RMDSO4 (MG/L AS SO4)

QUALITY CONTROL DATA FROM 06/01/89 TO 22/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

*** SULPHUR DIOXIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO2FR	Units	: ug/Filter as SO ₂
Work Station Code	: PRSEQ	Unit Code	: 361943
Method Code	: 004AI0	Supervisor	: F. Lo
Sample Type/Matrix	: W41 filters from LoVol and sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polyethylene tube
Other	: Filter is impregnated with potassium carbonate/glycerol solution.

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of 0.05% H₂O₂ in polyethylene tubes with one hour of mechanical shaking, followed by ultrasonic treatment to enhance extraction, then a 24 hour rest period. SO₂ is converted to SO₄ in the process.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the extract by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as SO₂. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Mechanical shaker; ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHUR DIOXIDE - PRSEQ - (SS02FR)

QUALITY CONTROL DATA FROM 12/01/89 TO 28/12/89

Lab: Ion Chromatography

Analytical Range: - to 350 ug/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	110	268.0	266.7	-1.3	2.9
b :	110	66.0	66.6	0.6	1.5
a+b :	110	333.0	333.0	-0.3	3.4
a-b :	110	202.0	200.0	-2.0	3.1

s.d.(AB) Sw(within run): 2.19 S(between runs): 2.32 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

317 - 349 for A+B
190 - 212 for A-B

DUPLICATES:

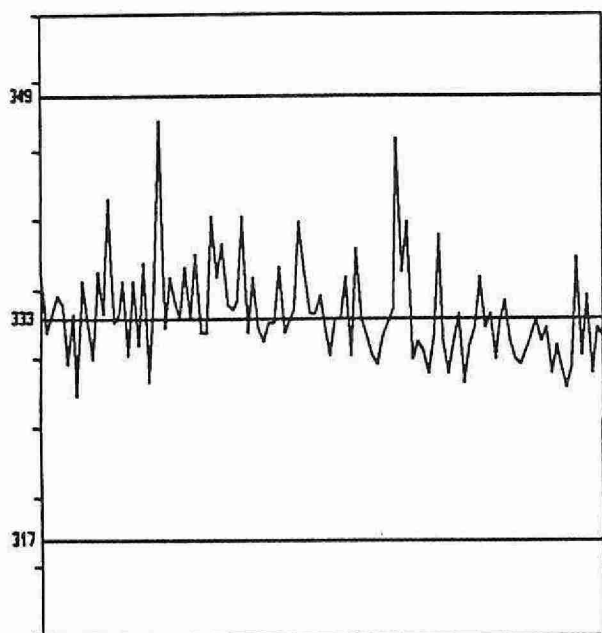
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
105	0 - 35	0.68	6.8
27	35 - 70	1.71	2.8
37	70 - 175	2.49	2.1
37	175 - 350	3.18	1.4
206	Overall	1.43	

OTHER CHECKS:

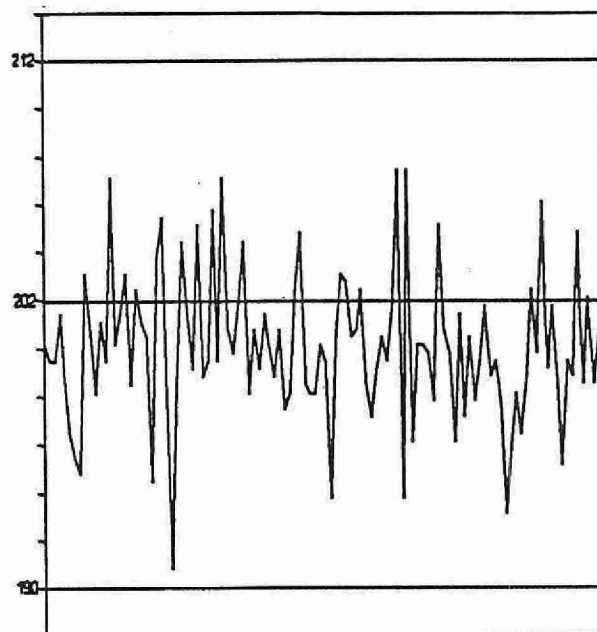
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	110	0.282	0.834

SULPHUR DIOXIDE - PRSEQ (UG/FILTER AS SO4)

QUALITY CONTROL DATA FROM 12/01/89 TO 28/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** TURBIDITY *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: RMTURB	Unit Code	: 343000
Method Code	: 002AI1	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with a sealed standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration : BL plus two standards, e.g. QCA

TURBIDITY - RMTURB

QUALITY CONTROL DATA FROM 06/01/89 TO 29/12/89

Lab: Colourimetry

Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	193	18.0	17.75	-0.25	0.142
b :	193	1.8	1.82	0.02	0.045
a+b :	193	19.8	19.57	-0.23	0.147
a-b :	193	16.2	15.93	-0.27	0.150

s.d.(AB) Sw(within run): 0.11 S(between runs): 0.10 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

18.6 - 21.0 for A+B
15.4 - 17.0 for A-B

DUPLICATES:

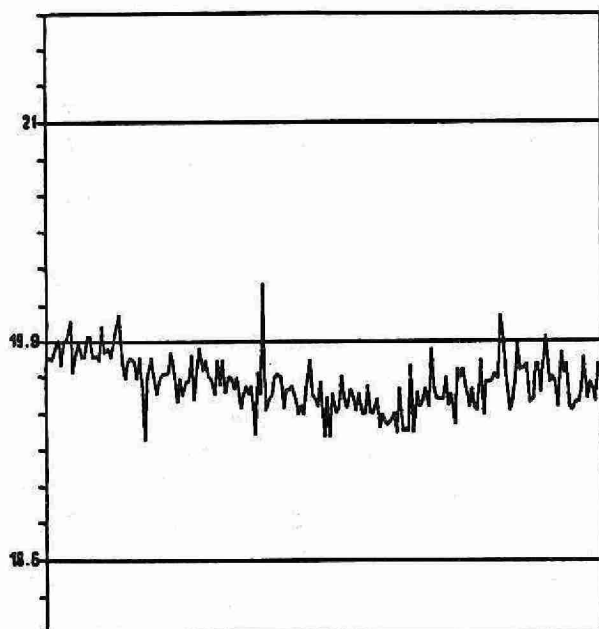
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
96	0.0 - 2.0	0.056	6.2
151	2.0 - 10.0	0.241	8.9
89	10.0 - 50.0	0.693	4.3
18	50.0 - 200.0	1.262	1.9
354	Overall	0.271	

OTHER CHECKS:

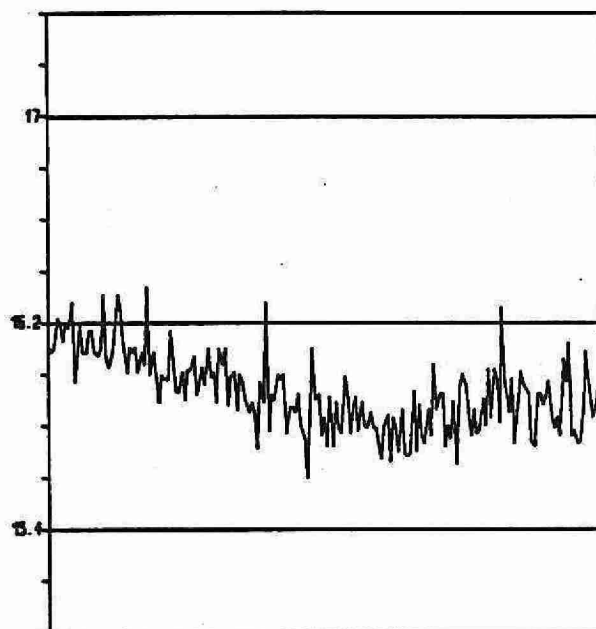
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	191	0.057	0.022

TURBIDITY - RMTURB (FTU)

QUALITY CONTROL DATA FROM 06/01/89 TO 29/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** TURBIDITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: WTURB	Unit Code	: 343000
Method Code	: 002AI1	Supervisor	: P. Campbell
Sample Type/Matrix	: Drinking Water, Industrial, Sewage		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with sealed secondary standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus formazin primary standards (at least once annually)

CONTROLS:

Calibration : BL plus two secondary standards, e.g. QCA

TURBIDITY - WTURB

QUALITY CONTROL DATA FROM 11/01/89 TO 29/12/89

Lab: Titration

Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	230	18.00	18.24	-0.24	0.0221
b :	230	1.80	1.78	-0.02	0.028
a+b :	230	19.80	20.02	-0.22	0.236
a-b :	230	16.20	16.46	-0.26	0.208

s.d.(AB) Sw(within run): 0.15 S(between runs): 0.16 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

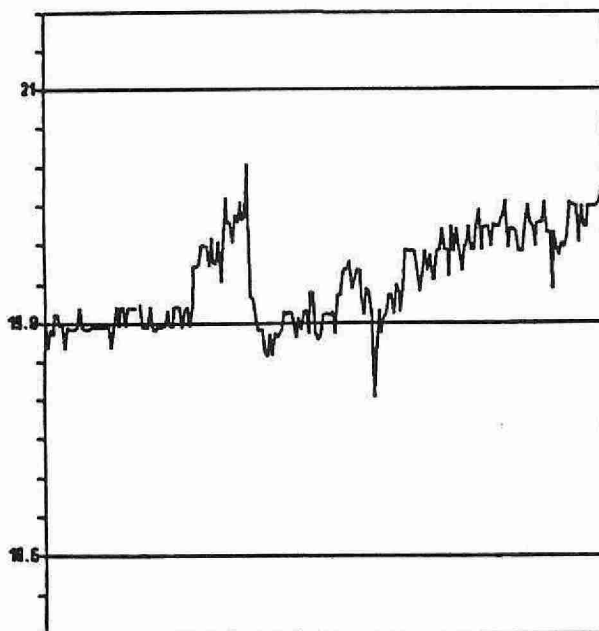
18.6 - 21.0 for A+B
15.4 - 17.0 for A-B

DUPLICATES:

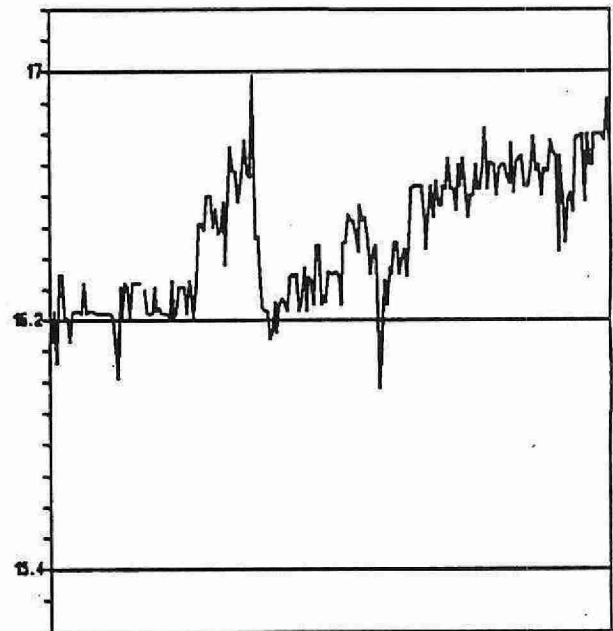
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
124	0.0	-	0.5	0.030	10.0
182	0.5	-	2.0	0.040	5.4
123	2.0	-	20.0	0.234	4.6
24	20.0	-	200.0	1.836	3.3
453	Overall			0.087	

TURBIDITY - WTURB (FTU)

QUALITY CONTROL DATA FROM 11/01/89 TO 29/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

***** TOTAL ZINC *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/03/86
LIS Test Name Code	: ZNUT	Units	: ug/L as Zn
Work Station Code	: DOASV	Unit Code	: 063830
Method Code	: 001PP2	Supervisor	: A. Neary
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 100 mL
Container	: 500 mL, acid washed Teflon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when zinc is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

Metrohm 646 VA Processor with Model 675 VA Sample Changer.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 2 standards daily

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA + EPA standard.
Duplicate	: End of every run (approximately every 8 samples)

TOTAL ZINC - DOASV

QUALITY CONTROL DATA FROM 04/01/89 TO 23/12/89

Lab: Dorset

Analytical Range: - to 15.00 ug/L as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	80	8.00	8.45	0.45	1.05
b :	80	2.00	2.36	0.36	0.58
a+b :	80	10.00	10.81	0.81	1.26
a-b :	80	6.00	6.09	0.09	1.14

s.d.(AB) Sw(within run): 0.81 S(between runs): 0.85 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.50 - 14.50 for A+B
3.00 - 9.00 for A-B

DUPLICATES:

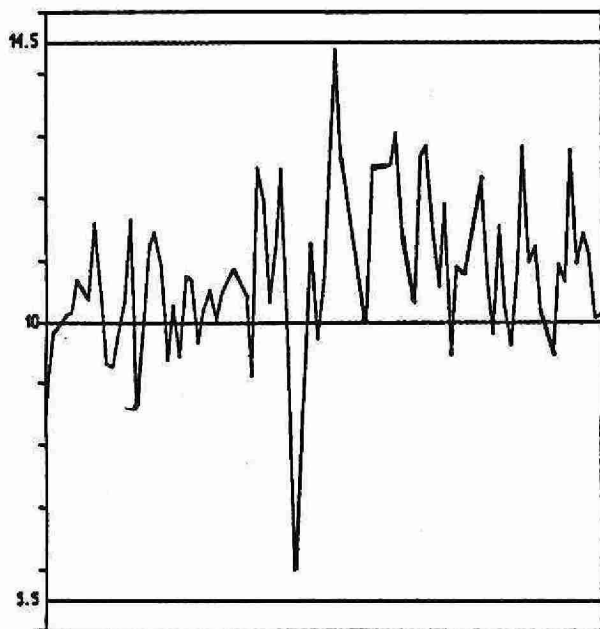
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
2	0.0 - 1.0	0.201	24.8
10	1.0 - 3.0	0.892	40.9
30	3.0 - 15.0	1.150	18.7
42	Overall	1.045	

OTHER CHECKS:

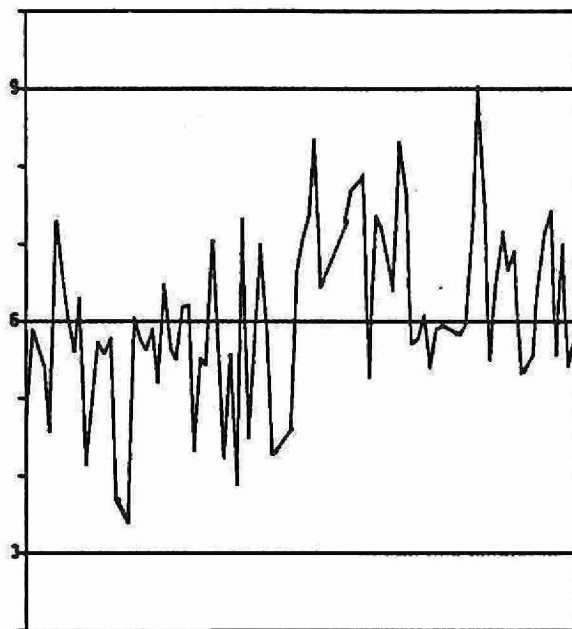
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	93	0.11	0.295

TOTAL ZINC - DOASV (UG/L AS Zn)

QUALITY CONTROL DATA FROM 04/01/89 TO 23/12/89



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

CONTROL LIMIT

*** ZINC - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ZNUT	Units	: ug/g as Zn
Work Station Code	: DOHMT	Unit Code	: 073830
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated, and sieved to < 2 mm. A subsample is ground to < 500 um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, mixed using a Vortex mixer and allowed to settle and decanted. The supernatant is analyzed for Zn by AAS at 217.0 nm using an air - acetylene flame.

Approximate absorbance: 0.3 at the full scale value.

Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.5

T value: 2.5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types, 2 method blanks, and one judiciously blended sample digest run with each run.

Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

ZINC - DOHMTE

QUALITY CONTROL DATA FROM 16/03/89 TO 07/11/89

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	5	79.0	80.74	1.74	2.32
b :	5	30.0	31.22	1.22	1.61
a+b :	5	109.0	111.96	2.96	3.79
a-b :	5	49.0	49.52	0.52	1.23

s.d.(AB) Sw(within run): 0.87 S(between runs): 1.99 S/Sw: 2.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

101.5 - 116.5 for A+B
44.0 - 54.0 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	37.2	1.36
R2 :	5	86.8	2.82
R2 :	5	40.7	2.07

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.0 - 20.0	N.A	N.A
5	20.0 - 50.0	2.22	8.7
3	50.0 - 100.0	0.44	0.6
9	Overall	1.13	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	5	1.94	1.326

PART 2.0

PERFORMANCE SUMMARIES - MICROBIOLOGY

*****ESCHERICHIA COLI*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: 1979
LIS Test Name Code	: ECMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: TFC 24	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL Glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hour at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. After incubation the membrane filter is transferred to a pad soaked in urease reagent and is given a reaction time of 15 minutes. All colonies that were yellow on mTEC agar and remain yellow on urease are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Medium QC	: Duplicate samples and blank filter between each sample.
	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

Escherichia coli - MSBACIND

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
123	0 - 30	2.9	2.6	17.3
58	31 - 75	6.8	6.6	12.5
24	76 - 150	10.1	9.7	8.6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
2840	205	7.2

MEDIUM QC: mTEC agar (previous batch) vs mTEC agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
11	0 - 30	3.8	3.3	22
25	31 - 75	6.1	5.3	10
18	76 - 150	8.3	6.8	6

*****ESCHERICHIA COLI*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1, 1986
LIS Test Name Code	: ECMMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: TGM 24	Supervisor	: M. Young
Sample Type/Matrix	: Waste Waters eg. Pulp and Paper effluent.		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC MUG agar and incubated for 21 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. Under UV light (long wave 366nm) all blue fluorescent colonies are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

*** FECAL COLIFORMS ***

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1979
	: Municipal Drinking Water		
LIS Test Name Code	: FCMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFPFA		
Method Code	: TF1 24	Supervisor	: M. Young
			: J. Clark
Sample Type/Matrix	: Surface, Waste and Drinking Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

FECAL COLIFORMS - MSBACIND

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filte:

DUPLICATES: Within-run precision

Number of Data	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
175	0	-	30	2.9	2.8	18.7
112	31	-	75	6.9	5.9	11.1
57	76	-	150	9.0	8.5	7.5

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
2644	29	1.1

MEDIUM QC: mTEC agar (previous batch) vs m TEC agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
11	0	-	30	3.8	3.3	22
25	31	-	75	6.1	5.3	10
18	76	-	150	8.3	6.8	6
0			>150	-	-	-

FECAL COLIFORMS - WQMFP

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
114	0 - 30	2.09	1.02	6.8
13	31 - 75	7.39	6.3	11.9
9	76 - 150	6.44	5.23	4.6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A	N.A	N.A

MEDIUM QC: mTEC agar LES (Selective) vs Brain Heart Infusion agar (Non- selective)
Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
4	0 - 30	2.8	2.2	14.7
4	31 - 75	8.3	6.3	11.9
4	76 - 150	3.5	2.8	2.5
1	>150	N.A	N.A	N.A

***** FECAL COLIFORMS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1, 1986
LIS Test Name Code	: FCMMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: TGM 24	Supervisor	: M. Young
Sample Type/Matrix	: Waste Waters eg. Pulp and Paper effluent.		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC MUG agar and incubated for 21 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. After the E. coli count is determined the filters are removed from mTEC MUG agar and placed onto mTEC agar. The plates are reincubated at 44.5° C for 1 hour (no ice is required). All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

***** FECAL STREPTOCOCCUS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: Apr. 1972
LIS Test Name Code	: FSMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: EF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 ml glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mEnterococcus agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies that are red, maroon or pink are counted as fecal streptococcus. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs non selective medium
	: Comparison of target counts on an old vs a new batch.

FECAL STREPTOCOCCUS - MSBACIND

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
135	0 - 30	2.7	2.5	16.7
81	31 - 75	5.0	4.6	8.7
54	76 - 150	8.3	7.3	6.5

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A	N.A	N.A

MEDIUM QC: mEnterococcus agar (previous batch) vs m Enterococcus agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
3	0 - 30	3.0	4.0	26.6
16	31 - 75	4.2	3.6	6.8
7	76 - 150	8.6	6.4	5.7

***** HETEROTROPHS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1, 1979
	: Municipal Drinking Water		
LIS Test Name Code	: HB35MF	Units	: Counts/mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFPFA		
Method Code	: SF 48	Supervisor	: M. Young
			: J. Clark
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mHPC agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies are counted as heterotrophs. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

: Duplicate samples and blank filter between each sample.

Medium QC : Colony counts are obtained using a pure culture and comparing the heterotrophic medium (mHPC) to the nonselective medium (BHIA).

: Comparison of colony counts on an old vs a new batch are done using water samples.

HETEROTROPHS - MSBACIND

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
61	0 - 30	3.1	3.6	24
18	31 - 75	8.4	8.6	16.2
8	76 - 150	15	15	13.3

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
1655	121	7.3

MEDIUM QC: mSPCI agar (previous batch) vs mSPCI agar (new batch) - inoculated with surface or drinking water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
5	0 - 30	3.6	3.0	20
7	31 - 75	8.0	6.4	12.1
6	76 - 150	8.3	6.5	5.8
2	>150	N.A	N.A	N.A

HETEROTROPHS - WQMFP

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
84	0 - 30	1.68	1.67	11.1
16	31 - 75	7.69	7.75	14.6
10	76 - 150	8.7	7.95	7.0

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
561	89	15.9

MEDIUM QC: mSPCI agar (previous batch) vs mSPCI agar (new batch) - inoculated with surface or drinking water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
5	0 - 30	3.6	3.0	20
7	31 - 75	8.0	6.4	12.1
6	76 - 150	8.3	6.5	5.8
2	>150	N.A	N.A	N.A

***** PRESENCE-ABSENCE TEST *****

IDENTIFICATION:

Laboratory	: Municipal Drinking Water	Method Introduced	: 1968
LIS Test Name Code	: PABOT	Units:Present/Absent/100mL	
Work Station Code	: WQMFWA	Unit Code	: 999000
Method Code	: LLSB10	Supervisor	: J. Clark
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

A 100 mL volume of sample is added to a presence-absence (P-A) bottle. The bottle is incubated at 35°C for 3 to 4 days and examined every 24 hours for acid or acid and gas formation. When a positive reaction for acid or acid and gas occurs, the inoculum is transferred to confirmatory media to determine the presence of total coliforms, fecal coliforms and other indicator organisms.

REPORTING:

Microbiological parameters are reported either as present or absent per 100 mL of sample.

CONTROLS:

	: A blank control sample is included for every 20 to 25 samples.
Medium QC	: P-A broth batches are checked for sterility at 20° and 35°C and inoculation of the medium is done with <u>E. coli</u> to determine its response. Dilutions of <u>E. coli</u> are passed through membrane filters which are subsequently placed on filter pads saturated with P-A broth and on an enrichment medium, such as Brain Heart Infusion Agar, to compare numbers of colonies recovered.

MODIFICATIONS:

1989-The latest revision of the P-A methodology is listed as WQPA-E322GA.1 available from the QA office.

PRESENCE ABSENCE (P-A) TEST - WQMFP

QUALITY CONTROL DATA FROM 09/01/89 TO 18/12/89

Lab: Municipal Drinking Water

CONTROL FILTERS:

Number of samples	Number of controls	Number of positive controls	Percent positive controls
22785	1118	1	0.09

MEDIUM QC: P-A Broth (Selective) vs Brain Heart Infusion agar (Non - selective)
Test Organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
8	0 - 30	2.4	2.1	14
15	31 - 75	5.7	5.2	9.8
14	76 - 150	16.4	17	15
12	>150	N.A	N.A	N.A

*****PSEUDOMONAS AERUGINOSA*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1980
LIS Test Name Code	: PSAMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: PF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mPA agar and incubated for 48 +/- 2 hours at 41.5 +/- 0.5°C to allow for colony development. All colonies that are dark brown, brown with darkened centers, tan and usually very flat in appearance are counted as Pseudomonas aeruginosa. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

Pseudomonas aeruginosa - MSBACIND

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
108	0	-	30	1.9	1.8	12
38	31	-	75	7.1	6.2	11.7
9	76	-	150	7.6	6.5	5.8

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
N.A	N.A	N.A

MEDIUM QC: mPA agar (previous batch) vs mPA agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
3	0	-	30	1.3	1.0	6.7
8	31	-	75	4.3	3.6	6.8
6	76	-	150	6.7	5.3	4.7

***** TOTAL COLIFORMS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: Jan. 1971
	: Municipal Drinking Water		
LIS Test Name Code	: TCMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFPFA		
Method Code	: LF 22	Supervisor	: M. Young
			: J. Clark
Sample Type/Matrix	: Surface Water, Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or PET bottle
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mENDO LES agar and incubated for 22 +/- 2 hours at 35 +/- 0.5°C to allow for colony development. All colonies with a dull to bright metallic green-gold sheen are counted as coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

TOTAL COLIFORMS - MSBACIND

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter:

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
75	0 - 30	2.6	2.4	16
26	31 - 75	5.0	4.5	8.5
13	76 - 150	6.7	6.5	5.8

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
2045	12	0.59

MEDIUM QC: mEndo agar LES (previous batch) vs m Endo agar LES (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
8	0 - 30	3.9	3.9	26
9	31 - 75	5.8	4.9	9.2
0	76 - 150	-	-	-
0	>150	-	-	-

TOTAL COLIFORMS - WQMFP

QUALITY CONTROL DATA FROM 13/02/89 TO 28/12/89

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
120	0 - 30	2.35	2.22	14.8
25	31 - 75	3.88	3.71	7.0
20	76 - 150	7.9	6.27	5.6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
3196	134	3.4

MEDIUM QC: mEndo agar LES (Selective) vs Brain Heart Infusion agar (Non- selective)
Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
2	0 - 30	2.0	1.6	10.7
6	31 - 75	4.3	3.4	6.4
14	76 - 150	9.8	8.7	7.7
10	>150	N.A	N.A	N.A

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ABBREVIATIONS

AAS	- Atomic Absorption Spectrophotometer
Abs	- Absorbance
APIOS	- Acidic Precipitation in Ontario Study
Av	- Average
Bl	- Blank
C	- Degrees Centigrade
cm	- Centimeter
Concn	- Concentration
Date	- Day/Month/Year
DDW	- Deionized, distilled water
DO	- Dissolved oxygen
DW	- Distilled water
ECSS	- Expert Committee on Soil Survey (Land Resource Research Centre)
EPA	- Environmental Protection Agency
FTU	- Formazin Turbidity Units
g	- Gram
HOAC	- Acetic Acid
HZU	- Hazen Units
IR	- Infra-Red
L	- Litre
LAB	- Laboratory
LIS	- Laboratory Information System
LTBL	- Long Term Blank
M	- Molar
meq	- Milliequivalent
mg	- Milligram
min	- Minute

ABBREVIATIONS cont'd

mL	- Millilitre
mm	- Millimeter
N/A	- Not Available or Not Applicable
nm	- Nanometer
QC	- Quality Control
QCA	- Quality Control Standard A
QCB	- Quality Control Standard B
QCC	- Quality Control Standard C
QCD	- Quality Control Standard D
R	- Recovery
rpm	- Revolutions per minute
S	- Between run standard deviation for QC
S ₁	- Standard deviation
S ₂	- Standard deviation for duplicates
S _w	- Within run standard deviation for QC
S. Class	- Weights that have not been certified
s.d.	- Standard deviation
Standard Cal	- Colourimeter setting to control electronic expansion
STD	- Standard
TCU	- True Colour Units
um	- Micrometer
ueq	- Microequivalent
ug	- Microgram
uS	- Micro-Siemen
UV	- Ultra-Violet
V/V	- Concentration based on volume measurements

APPENDIX A

W & T:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (2)(4). The code <W indicates that no measurable response was observed under the test conditions. The reported value indicates the smallest amount that could have been measured under routine conditions. W is smaller than the standard deviation of duplicates near zero. The <T code is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1, 2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1989

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Acidity-Gran	ueq/L H	PHACD	ACDG	1000	1.0	5.0
Acidity	mg/L CaCO ₃	PHACD	ACDT	100	0.05	0.25
Alkalinity	mg/L CaCO ₃	DOT	ALKT	80	0.05	0.25
Alkalinity	mg/L CaCO ₃	RATS	ALKT	1000	0.2	1.0
Alkalinity	mg/L CaCO ₃	WATS	ALKT	1000	0.2	1.0
Alkalinity	mg/L CaCO ₃	WQSDIRT	ALKT	1000	0.5	2.5
Alkalinity-Gran	mg/L CaCO ₃	DOT	ALKT1	25	0.5	0.25
Alkalinity-Gran	mg/L CaCO ₃	RATS	ALKT1	0.1	N.A	N.A
Aluminum	ug/g as Al	DOSOLAL	ALECA	40	0.2	1
Aluminum	% wt as Al	DOMETDI	ALEDI	1	0.01	0.05
Aluminum	% wt as Al	DOMETOX	ALEOX	2	0.01	0.05
Aluminum	% wt as Al	DOMETALX	ALEPY	0.5	0.01	0.05
Aluminum	meq/100g Al	DOCATION	ALESC	2.5	0.01	0.05
Aluminum	ug/L as Al	DOALSP	ALEXCV	1000	2	10
Aluminum	ug/L as Al		ALNDCV	1000	2	10
Aluminum	ug/L as Al	DOAAS	ALUT	200	1	5
Cadmium	ug/L as Cd	DOAAS	CDUT	2	0.01	0.05
Calcium	meq/100g Ca	DOCATION	CAESC	5	0.01	0.05
Calcium	mg/L as Ca	PRAA	CAUR	2	0.02	0.1
Calcium	mg/L as Ca	PRAAS	CAUR	8	0.05	0.25
Calcium	mg/L as Ca	RMAAS	CAUR	40	0.1	0.5
Calcium	mg/L as Ca	WAAS	CAUR	200	0.2	1
Carbon-Diss In	mg/L as C	DODIC	DIC	10	0.02	0.1
Carbon-Diss In	mg/L as C	ROM	DIC	40	0.2	1
Carbon-Diss Org	mg/L as C	ROM	DOC	20	0.1	0.5
Carbon Inorg	mg/L as C	DOTIC	TIC	2	0.01	0.05
Carbon Organic	% wt as C	DOOXMAT	ORGC	40	0.01	0.05
Carbon Org Tot	mg/L as C	WAC	TOC	50	1	5
Chloride	mg/L as Cl	COCL	CLIDUR	100	0.2	1
Chloride	mg/L as Cl	PRIC1	CLIDUR	2	0.01	0.05
Chloride	ug/filt Cl	PRLOV	CLIDUR	100	1	5
Chlorophyll-ac	ug/L	RCHLO	CHLRAC	10	1	5
Chlorophyll"a"	ug/L	RCHLO	CHLRAT	500	0.2	1
Chlorophyll"b"	ug/L	RCHLO	CHLRBT	75	0.1	0.5
Clay	% wt as Clay	DOPARTSZ	CLAY	100	1	5
Colour	HZU	DOCC	COLTR	100	1	5
Colour	TCU	WCOL	COLTR	100	0.5	2.5
Conductivity	uS/cm	DOCC	COND25	300	0.2	1
Conductivity	uS/cm	PRCON	COND25	100	0.2	1
Conductivity	uS/cm	RATS	COND25	1000	1	5
Conductivity	uS/cm	WATS	COND25	2000	1	5
Conductivity	uS/cm	WQSDIRT	COND25	10000	5	25
Copper	ug/L as Cu	DOASV	CUUT	4	0.3	1.5
Copper	ug/g as Cu	DOHMT	CUUT	50	0.2	1
Fluoride	ug/L as F	DOSPF	FFIDUR	70	0.2	1
Fluoride	mg/L as F	WFNO3	FFIDUR	2	0.01	0.05
Hardness	mg/L as CaCO ₃	RMAAS	HARDT		0.1	0.5
Hardness	mg/L as CaCO ₃	WAAS	HARDT		0.5	2.5
Iron	% wt as Fe	DOMETDI	FEEDI	2	0.01	0.05
Iron	% wt as Fe	DOMETOX	FEEOX	2	0.01	0.05
Iron	% wt as Fe	DOMETALX	FEEPY	1	0.01	0.05
Lead	ug/L as Pb	DOASV	PBUT	2	0.3	1.5
Lead	ug/g as Pb	DOHMT	PBUT	50	0.2	1
Magnesium	meq/100g Mg	DOCATION	MGESC	2.5	0.01	0.05
Magnesium	mg/L as Mg	PRAA	MGUR	0.5	0.005	0.025
Magnesium	mg/L as Mg	PRAAS	MGUR	2	0.005	0.025

APPENDIX B cont'd

W AND T VALUES FOR DATA REPORTED IN 1989

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Magnesium	mg/L as Mg	RMAAS	MGUR	10	0.02	0.1
Magnesium	mg/L as Mg	WAAS	MGUR	50	0.1	0.5
Manganese	% wt as Mn	DOMETOX	MNEOX	1	0.001	0.005
Nickel	ug/g as Ni	DOHMT	NIUT	50	0.2	1.0
Nitrogen-NH3+NH4	mg/L as N	DONUT	NNHTFR	1000	1	5
	ug/filt N	PRAM	NNHTFR	50	0.05	0.25
	mg/L as N	RNDNP	NNHTFR	2	0.002	0.01
	mg/L as N	SDNP	NNHTFR	50	0.05	0.25
	mg/L as N	PRAM	NNHTFR	2	0.002	0.01
		PRAM	NNHTUR	2	0.002	0.01
Nitrogen-NO3	ug/filt N	PRSEQ	NNO3FR	50	0.2	1.0
			NNRICF	50	0.2	1.0
	mg/L as N	PRIC1	NNO3UR	2	0.01	0.05
	ug/filt N	PRLOV	NNO3UR	100	0.5	2.5
Nitrogen-NO3+NO2	ug/L as N	DONUT	NNOTFR	500	2	10
	mg/L as N	RNDNP	NNOTFR	5	0.005	0.025
	mg/L as N	SDNP	NNOTFR	50	0.05	0.25
	mg/L as N	WFNO3	NNOTUR	20	0.1	0.5
Nitrogen-NO2	mg/L as N	RNDNP	NNO2FR	0.2	0.001	0.005
	mg/L as N	SDNP	NNO2FR	2	0.005	0.025
Nitrogen-T Kjdl	mg/L as N	RTNP	NNTKUR	2	0.02	0.1
	mg/L as N	STKNP	NNTKUR	50	0.05	0.25
Oxygen-BOD	mg/L as O	SBBOD5	BOD5	400	0.2	1
Oxygen-COD	mg/L as O	RCOD	COD	40	1	5
		RCOD	COD	40	1	5
	mg/L as O	SBCOD	COD	500	2	10
		SBCOD	COD	500	2	10
pH		DOCOP	PH	14	N.A	N.A
		DOT	PH	14	N.A	N.A
		PHACD	PH	14	N.A	N.A
		RATS	PH	14	N.A	N.A
		WATS	PH	14	N.A	N.A
		WQSDIRT	PH	14	N.A	N.A
		DOSOILPH	PHECA	14	N.A	N.A
		DOSOILPH	PHEW	14	N.A	N.A
Phenolics	ug/L Phenol	ROPHEN	PHENOL	50	0.2	1
Phosphorus	ug/L as P	DOBEP	PPO4BE	100	0.5	2.5
Phosphorus-Sol	mg/L as P	RNDNP	PPO4FR	0.1	0.0005	0.0025
	mg/L as P	SDNP	PPO4FR	10	0.02	0.1
Phosphorus-Tot	mg/L as P	RTNP	PPUT	0.2	0.002	0.01
	mg/L as P	STKNP	PPUT	10	0.02	0.1
	mg/L as P	DOP	PPUT1	200	0.2	1
			PPUT2	200	0.2	1
Potassium	mg/L as K	PRAA	KKUR	1	0.005	0.025
	mg/L as K	PRAAS	KKUR	1	0.01	0.05
	ug/filt K	PRLOV	KKUR	50	0.5	2.5
	mg/L as K	RMAAS	KKUR	5	0.01	0.05
	mg/L as K	WAAS	KKUR	25	0.05	0.25
Potassium	meq/100g K	DOCATION	KKESC	0.75	0.01	0.05
Sand	% wt as Sand	DOPARTSZ	SAND	100	1	5
Silicon	% wt as Si	DOMETOX	SIEOX	0.25	0.01	0.05
	mg/L as Si	ROM	SIO3UR	10	0.05	0.25
Silt	% as Silt	DOPARTSZ	SILT	100	1	5

APPENDIX B cont'd

W AND T VALUES FOR DATA REPORTED IN 1989

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Sodium	mg/L as Na	PRAA	NAUR	1	0.005	0.025
	mg/L as Na	PRAAS	NAUR	4	0.01	0.05
	ug/filt Na	PRLOV	NAUR	50	0.5	2.5
	mg/L as Na	RMAAS	NAUR	20	0.02	0.1
	mg/L as Na	WAAS	NAUR	100	0.2	1
Solids-Diss	mg/L	SOLIDS	RSF	3000	2	10
Solids-Ign	mg/L or mg/Kg	SOLIDS	RSFA	3000	2	10
			RSPA	3000	0.5	2.5
			RSTA	30000	2	10
Solids-Part	mg/L	SOLIDS	RSP	3000	0.5	2.5
Solids-Tot	mg/L or mg/Kg	SOLIDS	RST	60000	2	10
Sulphate	ug/g SO ₄	DOANIONX	SSO4EW	100	0.5	2.5
Sulphate	ug/filt as SO ₄	PRSEQ	SSO4FR	250	1	5
			SSO4NF	250	1	5
	mg/L as SO ₄	PRIC1	SSO4UR	10	0.05	0.25
	ug/filt as SO ₄	PRLOV	SSO4UR	10	1	5
	ug/filt as SO ₄	RMDSO4	SSO4UR	100	0.5	2.5
Sulphur Dioxide	ug/filt as SO ₂	PRSEQ	SSO2FR	350	1	5
Turbidity	FTU	RMTUB	TURB	200	0.05	0.25
	FTU	WTURB	TURB	200	0.05	0.25
Zinc	ug/g as Zn	DOASV	ZNUT	15	0.5	2.5
	ug/g as Zn	DOHMT	ZNUT	100	0.5	2.5



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